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Bureau of Land Management

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North Moccasins Forest Health Restoration Project

Location:
T. 18 N., R. 17 E., sections 24, 25 and 26 (portions of)
T. 18 N., R. 18 E., sections 30 and 31 (portions of)
Fergus County, Montana

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Chapter 1
Introduction and Need for the Proposed Action

1.0 Introduction

The Bureau of Land Management (BLM) Lewistown Field Office is proposing a combination of vegetation treatments, permanent and temporary road construction, along with obliteration of some existing roads and trails, and prescribed fire to improve forest health in the North Moccasin mountain range, Fergus County, Montana, (see vicinity map in Appendix A-1).

1.1 Purpose for the Proposed Action

The purpose for the Proposed Action is to:

1. Improve stand resiliency and diversity;
2. Maintain and/or restore wildlife habitat;
3. Removing insect and disease damaged timber;
4. Reduce fuel loadings and the potential losses associated with a stand replacing wildfire;
5. Provide for enhanced recreational opportunities;
6. Provide an economic boost to the local wood products industry.

1.2 Need for Action

Forests in the project area are in poor health and consist of dense, overstocked stands that are prone to stand-replacing disturbances such as insect and disease outbreaks and high-severity wildfire. Currently, the project area has experienced some attacks by the mountain pine beetle as well as the western spruce budworm. High fuel loadings associated with dead and dying timber, as well as vegetative composition and structures existing in the proposed project area, pose a high hazard of stand-replacement fire. A wildfire would threaten human health and safety as well as adjacent private property.

Forest health treatments will reduce stocking levels and restore structural characteristics that more closely resemble pre-European settlement conditions to enhance and protect multiple resources: including wildlife habitat, private property, water quality, recreational resources, aesthetics, and timber values. The need for this action is authorized by the Federal Land Policy & Management Act (FLPMA) under section 102 (a) (12) and is in accordance with the Code of Federal Regulations (CFR) 43 Sub-Chapter E – Forest Management (5000).

1.3 Objectives of Vegetative Treatments

The objectives of these treatments would be to improve forest health. To meet these objectives the proposed action would:

- Reduce stand density of conifer trees to decrease the risk of epidemic level insect attacks and/or catastrophic wildfire. Specifically: Remove dead and dying Lodgepole pine and Douglas-fir and thin forested stands that have not yet been attacked by insect and disease and reduce the level of hazardous fuel buildup in order to minimize the risk of catastrophic fires;
- Design treatments and silvicultural prescriptions that encourage expansion of Aspen trees, shrubs, and key forage species along with providing for open spaces for wildlife;
- Retain large trees, snags and untreated areas for structural diversity and wildlife habitat;
- Decrease the potential for a catastrophic wildfire by reducing hazardous fuel loadings;
- Obliterate/reclaim and stabilize unnecessary roads and trails as well as developing and maintaining some open

roads and trails for additional recreational activities;
- Provide wood products for the local economy.

1.4 Scope of this Environmental Analysis

1.4.1 History\Public Involvement

- General forest inventory and reconnaissance began in the fall/winter of 2014/15;
- Informal meetings with immediate adjacent landowners throughout winter and spring 2015;
- Press Release including radio spots and article in Lewistown News Argus December 2014 and January 2015 asking public to provide input comments and concerns on proposed project;
- Posted on Field Office webpage, (NEPA log) 10/28/2015;
- On site meeting with interested landowners October 2015;
- Presentation to RAC 1/26/16.

1.4.2 Issues Identified During Scoping

- Preservation of visual quality: Specifically the "straight line effect" of proposed roads;
- Reduction of the risk of wild land fire: Area residents are concerned about wild land fire damaging the remaining unburned forested lands and increasing the risk to human life, private property, and structures.
- Declining forest health: Mortality from insect/disease activity increases the risk of stand replacement fires, threats to human lives and property, and alters the view shed.
- Utilization of wood products: Public comment included the desire that utilization of useable wood products be a consideration for any activity in the project area.
- Enhancement of wildlife habitat: The project area includes habitat for elk, and deer, and is a popular area for hunters due to an open public road.
- Treating and limiting the spread of noxious weeds: Invasive species and non-native plant spread is a concern in the entire North Moccasins.
- Road use after the project is completed: Some residents have expressed an interest in leaving the road(s) open to provide for additional access while others prefer no roads be built and access is limited to walk-in only.
- Consider vehicle size restrictions on some permanent roads.

1.4.3 Relevant Planning Documents

The proposed action identified in this Environmental Analysis (EA) conforms to the Judith Resource Management Plan (RMP), (1994). In addition, this action is in conformance with the Fire/Fuels Management Plan Environmental Assessment/Plan Amendment for Montana and the Dakotas 2003 and the Forest Health and Vegetation Management for the Judith and Moccasin Mountains 2006.

1.5 Decision to Be Made

The BLM, Lewistown Field Office Manager will decide whether to implement vegetation treatments with the objective of removing dead and dying timber, reducing stand density, building new/permanent roads and implementing prescribed fire within the proposed project area. If selected, the proposed action would involve the following treatments:

1. Hand and mechanical forest treatments to remove insect and disease damaged trees and reduce stocking levels and fuel loadings on up to 900 acres throughout a 1200 acre project area;

2. Construction of approximately 27,000 feet of permanent roads for the purpose of conducting forest health activities and further providing additional recreational opportunities following forest management. Any additional temporary roads and trails needed for project implementation would be obliterated/reclaimed and stabilized upon completion of projects;

3. obliterate/reclaim and stabilize approximately 17,000 feet of existing roads and trails that were previously closed and now re-opened through unauthorized uses;

4. Remove conifer encroachment within natural open areas and meadows and adjacent to existing Aspen stands and other desirable hardwood species;

5. Reduce the threat of catastrophic wildfire by creating strategic fuel breaks and/or changes in plant communities;

6. Utilize prescribed fire (pile burning, jackpot, broadcast) to improve forest health conditions including:
   - Disposal of logging debris;
   - Stand density reduction and hazardous fuels reduction;
   - Improved big game habitat;
   - Rejuvenation of Aspen and other hardwood species.

1.6 Applicable Statutes, Regulations, and Other Plans

These Statutes, Regulations and other plans all apply to this project:

- The Federal Land Policy and Management Act (FLPMA) of 1976 established policy and guidelines for the administration, management, protection, development, and enhancement of public lands (43 U.S.C 1701 et seq.: 90 Stat. 2743; P.L.94-579);
- Archeological Resource Protection Act of 1974;
- National Environmental Policy Act of 1969, as Amended (42 U.S.C. 4321 *et seq.*);
- 1973 Endangered Species Act, as amended;
- Clean Air Act of 1977, as amended, U.S.C. 7401 *et seq.*;
- Executive Order 13112 (Invasive Species) 1999;
- Executive Order 13186 (Migratory Birds) 1918;
- Judith Resource Management Plan, 1994 as amended by the 2003 Fire/Fuels Management Plan;
- Montana Streamside Management Zone (SMZ) law (77-5-301[1] MCA), as amended;
- Forest Health and Vegetation Management for the Judith and Moccasin Mountains, (JMLA), June 2006.

Chapter 2
Description of Alternatives

2.0 Introduction

This chapter describes the process used to develop alternatives and describes the alternatives considered in detail as well as those alternatives considered but eliminated from further analysis. This chapter also discloses the objectives that the BLM intends to reach if the proposed action is implemented and describes the steps that would be taken to minimize unnecessary environmental degradation.

2.1 History and Process Used to Formulate the Alternatives

In addition to the public involvement listed in Section 1.4, the results of interdisciplinary involvement, (see Chapter 4.0 Consultation and Coordination) were considered while formulating alternatives.

2.2 Alternatives Considered but Eliminated from Further Analysis

2.2.1 Prescribed Fire Only Alternative:

Prescribed fire under existing fuel conditions would be difficult to control, costly, and pose an unacceptable risk to human health and safety and surrounding private property. Current hazardous fuels loadings are too high for even a moderate intensity prescribed fire. The prescription and expected fire behavior needed to reduce fuel loadings would be unacceptable and lead to undesirable whole stand mortality in the treatment area. The area would still require mechanical treatments after a prescribed fire. A low to moderate intensity prescribed fire could be used as part of a two- or three-step maintenance treatment in another alternative, but should not be considered an alternative in itself.

2.2.2 Non-Conventional Logging Systems Alternative (helicopter and other specialized aerial logging equipment):

Market research was done via phone calls, informal site tours and appraisals of timber value to determine if other means of mechanical treatments could be economically completed without road building. In all cases, non-conventional logging systems were not economically viable without a significant change in the market conditions associated with the timber industry. The sole reason for eliminating non-conventional logging systems as an alternative was due to current and expected economic constraints.

2.3 Description of Alternatives

2.3.1 Alternative 1: No Action

In this case, No Action has been defined as a continuation of past management practices. Under the No Action Alternative, no new roads/trails would be constructed, no existing roads/trails would be obliterated or reclaimed, no mechanical treatments, hand treatments, or prescribed fire would be implemented within the project area in a timely manner. Insect and disease damaged timber would remain on the landscape and likely increase the potential for catastrophic fire. Hazardous fuel loadings would not be mitigated.

2.3.2 Alternative 2: Vegetative Treatment (Proposed Action)

The Bureau of Land Management (BLM), Lewistown Field Office is proposing a combination of vegetation treatments, permanent and temporary road construction, along with obliteration of some existing roads, and prescribed fire to improve forest health in the North Moccasins, Fergus County, Montana, and beginning in 2016. The 1200 acre project area is located on public lands within T. 18 N.,

R. 17 E., portions of sections 24, 25 and 26 and T 18 N., R 18E., portions of sections 30 and 31 and is approximately 10 miles northeast of Lewistown, Montana in the North Moccasins mountain range. Elevations of treatments range from 4600 - 5400 feet.

The Proposed Action consists of various mechanical and hand treatments along with prescribed fire throughout a1200 acre project area, (excluding any private land).

Appendix A-2 is a map that illustrates the forest stand types that make up the project area. Chapter 3 further describes the affected environment and environmental consequences of the proposed action along with any cumulative impacts. These treatments would result in varying degrees of both commercial and non-commercial timber removal along with other forest health activities and prescribed fire. Specifically, treatments would be accomplished through the use of hand or mechanized fallers and cable, or ground yarding systems to designated landing sites. Leave trees (trees designated for retention) could be left in patches or spread unevenly across portions of the treatment units in order to provide for a more natural look to the treatment units while meeting the forest health objectives. However, some portions of treatment units would be patch clearcuts due to stand types along with the level of insect damage and disease that has already occurred in the area. Ground based mechanized equipment would be limited to operating on slopes averaging 45 percent or less. Cable or aerial systems would be used on sustained slopes in excess of 45 percent to avoid resource damage within sensitive areas. Operating ground based equipment would only be permitted when the soils are in a condition that avoids severe rutting and compaction. Conifer encroachment immediately adjacent to and within Aspen stands would be removed and the ground scarified, (expose up to 35% bare mineral soil) to allow for expansion of Aspen and other hardwoods and shrubs

The BLM would establish all treatment unit boundaries, roads, landings and skid trails prior to any treatments being implemented. Commercial treatments would be implemented over an 18-36 month contract period. BLM resource specialists would routinely inspect the treatment area to ensure compliance with all contract stipulations. Additional non-commercial contracts along with work done by BLM personnel could take place for an additional 2-5 years as necessary to complete forest health treatments.

All temporary roads/trails would be minimally constructed solely for the purpose of accessing treatment units. Temporary roads/trails would not be available for general use from the recreating public and would be obliterated/reclaimed and stabilized to a level that restricts motorized uses prior to termination of all contracts. The maximum time frame for temporary roads to be on the landscape would be up to 36 months. However, contract time frames of 18-24 months are more typical.

3 new permanent roads totaling approximately 27,000 feet along with closure of approximately 17,000 feet of redundant and unauthorized trails are proposed (see map Appendix A-3). Permanent roads will be designed to allow for maximum stability and drainage while minimizing potential for erosion. Permanent roads and trails would be available for general public use although motorized travel and/or seasonal and restrictions may apply to avoid road damage and conflicts with wildlife.

Noxious weed control measures would be incorporated into all contracts. Weed control would be in conformance with the current guidelines and procedures described in Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States Final EIS, June 2007. (A new Biological Assessment for Vegetation Treatments using Aminopyralid, Fluroxypyr and Rimsulfuron on Bureau of Land Management lands in 17 Western States, April 2015 is out for review and expected to be

approved during this project). All noxious weed control efforts would be monitored by the BLM. Seeding disturbed areas, major skid roads, temporary roads, and burned piles with native species would discourage weed infestation. Forest treatment contracts would include a requirement to pressure wash all off-road equipment before entering the project area. Periodic weed spraying by BLM personnel or contractors would occur (as necessary) throughout the life of the contract and in subsequent years as needed.

All mechanical or hand treatments and road activities would adhere to the Water Quality Best Management Practices, (BMPs) for Montana Forests (publication EB158, MSU Extension Publications) (Logan 2001).

2.3.2.1 Design Features of the Proposed Action:

Air Quality:

- Any prescribed burning would be implemented on a predicted good or better smoke dispersal day to limit smoke impacts;
- Compliance with local smoke management programs would minimize the effects of temporary increases in particulates and carbon monoxide and decreased visibility during prescribed burning activities;

Cultural Resources:

- All contracts for vegetation treatments and related fuels reduction activities would contain guidance for protection of any historic properties eligible for listing on the National Register of Historic Places discovered during fulfillment of the contract;

Noxious, Invasive, and Non-Native Species:

- Integrated treatments and monitoring of/for invasive and non-native plant species would continue to occur in the proposed project area;
- Timing of activities would concur with herbicide label instructions and recommendations and the availability of biological agents;
- Adhering to Montana BMPs would minimize ground disturbance; thereby reducing the potential spread of noxious weeds;
- Seeding disturbed areas, major skid roads, temporary roads, and burned piles would discourage weed infestation;
- Any contracts would include a requirement to wash all off-road equipment before entering the project area;
- Additionally, existing approaches, roads, and trails would be inventoried and "pre-treated" for known weed infestations prior to project initiation;

Wetland/Riparian Zones:

- All road construction would follow best management practices for forest road construction;
- Temporary road construction, associated timber harvests, and road removal would occur as timely as possible to minimize the time disturbance is present on the ground;
- Live trees and recruitment stands of young age-class trees would be left to facilitate recruitment of new forest;
- Erosion control devices such as water bars and drain dips would be incorporated into the design of the existing and proposed permanent roads and into all temporary roads and skid trails as needed;
- Gate permanent roads at locations that will preclude unnecessary motorized access while continuing to allow non-motorized recreational opportunities, (especially into Bedrock canyon and the upper reaches of Plum Creek);

Lands and Access:

- Roads, stream crossings, skid trails, and landings would be designed and administered so as to cause the least impact;
- Logging, skidding, and hauling operations would be limited to dry, frozen or snow covered conditions;

- Road cuts and fill slopes would be stabilized and re-seeded after use to native vegetation, where necessary;
- At the conclusion of the forest treatment operations, temporary roads would be obliterated and reclaimed;
- Montana BMPs would be applied both during and after activities to ensure road use and maintenance does not promote erosion and degrade water quality;
- All operations taking place within the Streamside Management Zone (SMZ) would be properly permitted by the appropriate agencies prior to beginning work;

Recreation:

- Periods of timber management activities could be altered to avoid the high-use recreation period (hunting seasons);
- Gates may be installed on some permanent roads following forest management treatments in order to provide for wildlife security and/or restrict vehicle size;

Soils:

- New road locations will be based on topography, drainage, soils and other natural features and constructed with varying road grades greater than 2% but less than 8% to minimize erosion;
- New permanent roads would be bladed, and ditched, with water bars installed to reduce overland water flow on the road;
- Where necessary, short steep pitches under 300 feet are acceptable;
- Ground based equipment will be limited to slopes with average gradients of less than 40%. Cable and aerial systems will be used where sustained slopes are in excess of 40%;
- Log landings will be located on natural benches and or flat areas;
- Use of ground based equipment is limited to conditions when soils are not susceptible to severe rutting and compaction;
- Construct cut and fill slopes at stable angles that will be not exceed a 3:1 ratio;

Visual Resources:

- Treatment units will be designed utilizing "leave trees" and "islands of trees" along with "feathered edges" to help reduce the abrupt edges of cutting units;
- Leave scattered large woody debris, rocks, etc. to produce a "roughening" of the surface to reduce the bare ground effect of treatments;
- Permanent roads and trails would be screened by leaving taller vegetation (shrubs, trees and snags) that extend from below fill slopes to above cut slopes where possible to help break up the "straight line effect";
- Road obliteration/reclamation would involve roughing up the travel way, moving the "fill" back onto the travel way, seeding the road with native vegetation, and placement of large objects, such as down trees and boulders to restrict motorized access;
- Edges from treatment units would meander and follow natural topography so as to blend more with the natural landscape;

Wildlife:

- Temporary roads would be constructed for the purpose of conducting forest health activities. Temporary roads would not be available for general public use and would be reclaimed following treatments;
- Bedrock road would be restricted to non-motorized uses by the general public. Once re-entry into project area is no longer foreseeable or needed, the road or a portion would be reclaimed;
- Redundant and unauthorized roads or trails will be obliterated/ reclaimed. Mason plum road will have a size restriction past gate 'A' and will be closed past gate 'B' (see Map A-3);
- If timber sale operators decide to camp in the project area, operators would follow the USFS guidelines for proper food storage;
- Treatments will be designed to aggressively promote regeneration of deciduous shrubs and aspen patches;
- For forest favoring specialist species found within the projects area: Exclude areas from

treatment that boarder or are adjacent to SMZ's to promote keeping "patches" the largest size possible;

- For bats and cavity nesters; keep large (12 inch DBH and 20 ft. tall or taller) and all inhabited snags. The project should maintain an average of three snags per acres to be used as roosts and nesting sites;
- If wildlife desirable snags present safety hazards to crews, exclude treatment as opposed to cutting snags especially if the snags are in a "patch";
- Entry into units with high probability of bats (cliffs, caves, large snag patches, etc…) will be limited to winter implementation only;
- Leave a (300 ft.) buffer of trees around cliffs, rock outcroppings, caves, and mine shafts, if found in the project area, to maintain temperatures of potential bat roosting areas and limit disturbance to hibernating bats;
- The project area will be defined into units and consultation with the project biologist will help determine timing of individual unit entry, road entry/ location, and seasonal or timing restrictions to reduce impacts to nesting birds, bats and other wildlife found during nest surveys and site visits;
- If an anticipated ROW application is not received on the iron gulch road prior to conclusion of the contract, the iron gulch road will be reclaimed;
- A native seed mixture would be used to re-vegetate roads, landing areas and trails after use;

Chapter 3
Affected Environment and Environmental Consequences

3.0 Introduction

This chapter summarizes current conditions and provides a baseline against which to measure the features of the alternatives. It also describes how conditions might be affected under the Proposed Action Alternative and the No Action Alternative. The Environmental Consequences portion of the analysis provides the scientific basis that supports the summary found in Chapters 1.0 and 2.0.

3.1 Description of Relevant Affected Resources

3.1.1 Critical Elements: The BLM NEPA process requires consideration of those elements of the human environment, which are considered especially important to the quality of human life. Protections for these values are provided through Federal and State Executive Orders, statutes, and regulations, (Table 1).

Table 1 Critical Elements of the Human Environment and Other Resources Brought Forward for Analysis:

CRITICAL ELEMENTS		
Determination*	**Resource**	**Rationale for Determination**
NI	Air Quality *(The Clean Air Act of 1955, as amended)*	See Section 3.1.1, Air Quality
NP	Areas of Critical Environmental Concern *(Federal Land Policy and Management Act of 1976)*	The proposed action is not within an ACEC
NI	Cultural Resources *(National Historic Preservation Act of 1966, as amended)*	See Section 3.1.1, Cultural Resources

NP	Environmental Justice *(Executive Order 12898)*	The proposed action would have no disproportionately high or adverse human health or environmental effects on minority and/or low-income populations
NP	Farmlands (Prime & Unique) *(Surface Mining Control and Reclamation Act of 1977)*	The proposed project area does not support any classified farmlands (prime or unique) that could be affected by the proposed action.
NP	Floodplains *(Executive Order 11988)*	There are no floodplains within the proposed project area.
PI	Invasive, Non-native weed species *(Federal Noxious Weed Act of 1974, as amended)*	See Section 3.1.1, Noxious, Invasive and Non-native species.
NP	Native American Religious Concerns *(Executive Order 13007)*	No Native American Religious Concerns are known in the area, and none have been noted by Tribal authorities. Should recommended inventories or future consultations with Tribal authorities reveal the existence of such sensitive properties, appropriate mitigation and/or protection measures may be undertaken.
NP	Threatened, Endangered (T & E), Candidate Plant/Animal and Special Status Species *(Endangered Species Act of 1973, as amended)*	There are no known Threatened, Endangered (T & E), Candidate Plant/Animal and Special Status Species in the proposed project area. See Section 3.1.1
NP	Wastes (hazardous or solid) *(Resource Conservation and Recovery Act of 1976, and Comprehensive Environmental Response, Compensation, and Liability Act of 1980)*	There are no known hazardous or solid wastes currently located in the proposed project area.
NI	Water Quality (drinking/ground) *(Safe Drinking Water Act of 1974, as amended and Clean Water Act of 1977)*	The proposed action would not impact water quality or water quality sources for drinking or ground water. See Section 3.1.1
NP	Wetlands / Riparian Zones *(Executive Order 11990)*	The proposed project area does not support any jurisdictional wetlands or riparian areas that could be affected by the proposed action. See Section 3.1.1
NI	Climate Change	The proposed action would not impact Climate Change. See Section 3.1.1
NP	Wild and Scenic Rivers *(Wild and Scenic Rivers Act of 1968, as amended)*	There are no river segments which have been found to be either eligible or suitable for potential designation as a Wild and Scenic River in the vicinity of the proposed project.
NP	Wilderness *(Federal Land Policy and Management Act of 1976 and Wilderness Act of 1964)*	There are no designated or proposed wilderness areas within the vicinity of the proposed project area.

OTHER RESOURCES / CONCERNS

Determination*	**Resource**	**Rationale for Determination**
PI	Fuels / Fire Management	See section 3.1.2, Fire and Fuels Management
PI	Fish and Wildlife including Special Status Species other than FWS candidate or listed species e.g. Migratory birds *(E.O. 13186)*	See section 3.1.2, Wildlife
NP	Geology / Mineral Resources/Energy Production	The proposed action would have no impacts on geology, mineral resources, or energy production.
PI	Lands / Access	See section 3.1.2, Lands/Access
NP	Livestock Grazing *(Taylor Grazing Act of 1934, National Environmental Policy Act of 1969 Endangered Species Act of 1973, Federal Land Policy and Management Act of 1976, and the Public Rangelands Improvement Act of 1978)*	The proposed action does not affect Livestock Grazing to the extent a detailed analysis is required.

NP	Paleontology *(Paleontological Resources Protection Act P.L. 111-011, HR 146)*	The proposed action does not affect Paleontological Resources to the extent a detailed analysis is required..
PI	Recreation	
NI	Socioeconomics	See section 3.1.2, Socioeconomics.
NI	Soils	See section 3.1.2, Soils.
NI	Vegetation including Special Status Plant Species other than FWS candidate or listed species	See section 3.1.2, Vegetation.
NI	Visual Resource Management *(FLPMA 1976, NEPA 1969)*	
NP	Wild Horses and Burros *(Wild and Free Roaming Horses and Burros Act of 1971, as amended)*	The proposed project area is not within a wild horse and burro management area.
NP	Wilderness Characteristics	The proposed project area does not contain any lands which have been inventoried and found to possess wilderness characteristics.
PI	Woodlands/ Forest Health	See section 3.1.2, Woodlands/Forest Health.

*

NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present and may be impacted to some degree. Will be analyzed in affected environment and environmental impacts.
(NOTE: PI does not mean impacts are likely to be significant in any way).

Air Quality:

Affected Environment: The project area is located in the North Moccasins mountain range approximately 17 miles north of Lewistown, MT. There are scattered ranches and homes that surround the mountain range along with a few seasonal residences located within the mountains themselves. The Kendall Mine (which is directly south and adjacent to the project area) is no longer active but is conducting ongoing reclamation work. In addition, there are rural outbuildings along with a Boy Scout camp facility adjacent to the project. There is no Class I air shed or non-attainment areas within the immediate vicinity.

Environmental Consequences: Mechanical vegetation treatment projects in themselves do not typically pose any environmental consequences related to air quality. Under the Proposed Action, there could be related slash disposal and fuels management activities that include burning piles and prescribed burning, which have the potential to exceed air quality standards such as particulate matter for short periods of time. However, the overall impacts on air quality from burning slash or implementing a low to moderate intensity prescribed burn would be less severe than the smoke impacts resulting from a high intensity stand replacement wild land fire that is likely to occur under the No Action Alternative.

Cultural Resources:

Affected Environment: A Class III inventory was conducted in June 2015; see Cultural Resource Inventory Report #15-MT-060-005. No historic properties or cultural resources were located within the project area. The Montana State Historic Preservation Office (SHPO) has received copy of the report and has concurred with the findings in a letter dated Sept. 29, 2015.

Environmental Consequences: Under the No Action Alternative, there would be no impact to unknown/unrecorded cultural resources not identified during the cultural inventory (i.e. buried in duff and not visible during pedestrian survey). Under the Proposed Action Alternative, no historic properties would be affected. However, the potential remains for unknown/unrecorded cultural resources to be discovered during project implementation.

Invasive, Non-Native Species: Executive Order 13112 (Invasive Species) requires Federal agencies to identify actions that may affect the status of invasive species. It also contains measures addressing prevention, detection, response, monitoring, native species restoration, development of technological controls, public education, and authorization/funding of such actions, and establishes an Invasive Species Council.

Affected Environment: There are isolated pockets of Canada thistle and hounds tongue along the existing road and within some of the past disturbed areas. BLM has an agreement with Fergus County whereby they routinely spray the public access road yearly. Additional weed control by both BLM and other contracted groups occurs yearly in throughout the project area. No other known populations of Invasive, Non-Native species are known to exist.

Environmental Consequences: The project area is accessed via a public travel route. Therefore, the likely hood of noxious weeds or other non-native invasive species getting established is likely to occur even without the proposed vegetative treatment. The proposed vegetative treatments do allow for mechanized ground disturbance and prescribed fire, which will expose additional bare mineral soil, (a potential seed bed). The contractor will be required to deposit a non-refundable fee with the BLM, which is used for site re-habilitation including, but not limited to, weed control.
Mitigation and Monitoring: Noxious weed mitigation in the project area would continue with treatments and monitoring. Timing of activities with dry periods or when ground is frozen and following the Montana BMP's to minimize ground disturbance would minimize the further spread of noxious weeds. Proposed management would also follow guidance found in BLM's "Partners against weeds: An action plan for the Bureau of Land Management" (1996). Seeding disturbed areas, major skid roads, any temporary roads and burned piles would discourage weed infestation. Any contracts would include a requirement to wash all off-road equipment before entering the project area.

Threatened, Endangered (T & E), and BLM Sensitive Species (SSS):
Affected Environment: The North Moccasin range is about 22,450 acres of BLM, ST, and Private land. The BLM manages 3,300 acres (~15%) of the area and the State manages about 630 acres (~3%). The North Moccasin mountain range is an isolated mountain range about five miles from the South Moccasin range and about ten miles from the Judith mountain range. Two major highways separate the three ranges. The land between the mountain ranges consists of a mix of prairie grasslands, streams, and farmland. The South Moccasin and Judith ranges have the same forest habitat types as the North Moccasins. The South Moccasin range is similar in size to the North Moccasin range but is landlocked with no public access. The Judith range is larger with legal motorized access. Due to the isolation of the North Moccasin range and the expected species in the project area, the analysis area will be limited to the North Moccasin range for this section as well as

the Wildlife section. The North Moccasin range was defined by the Montana State office GIS Layer located at: \\blm\dfs\loc\EGIS\MT\gisprojects\StateOffice\24K\Boundaries\Mtn_Ranges\Montana_Mountain_Ranges.shp).

The North Moccasin range includes an extensive network of authorized and unauthorized primitive roads (~11 miles) used for motorized recreational use. No travel management plan is in place and the roads are currently used.

Five different landowners own 141 acres of private land (mining claims) within the project area. There are least two seasonal cabins being used regularly on these partials. The main BLM access road crosses 33 acres of private land controlled by three landowners. An old logging or mining road exists on private property. This road has the ability, with proper private easements, to give access to the two landowners; their only access.

The main existing BLM road access the project area through an easement with Kendal Mine located immediately south and west of project area. The mine is in the process of being reclaimed. Currently water treatment is the only reclamation occurring, all ground disturbing reclamation has been finished.

A wild fire burned ~800 acres on the northeast corner of the range around 1929-30. The forest in the fire scar has not recovered and the area is a montane meadow.

Portions of the North Moccasins are included in four different active grazing allotments; however, livestock grazing in the project area doesn't occur due to lack of grass and water.

T&E Species or habitats do not occur in the analysis area. Some expected BLM Sensitive Species include: (See Appendix A5)

- The Veery and the Black-backed and Red-headed Woodpeckers could exist in the area as they forage. The lack of water and riparian habitat types in the project area makes the foothills with better for nesting habitat for these species.
- Various species of Bats including the Fringed myotis, Spotted bat and Towsnsend's Big-eared bat would be expected in the area. From 1997 to 1999 Hendricks (2000) and again in 2002 surveys of several areas in the Judith and Moccasin mountain ranges were conducted. Sites were identified with Townsend Big-eared bats but none are in the project area. The area is identified as summer or migration range for the Spotted bat and Fringed myotis. They use a wide variety of habitat types. Nesting and nursery sites are believed to be in cracks, crevices, caves or abandoned mines. Hibernacula include caves and abandoned mines for non-migrating species. Non-migrating species are expected to be present in the analysis area year round. Bald Eagles and Golden Eagles have been known to occur in the area. No active nests are known to occur in the treatment area and the closed forest canopy offers little foraging opportunity outside of scavenging species that die within the area. It is expected that the Eagles utilization of the area would occur on the lower

private property portions of the North Moccasin range where more prey species occur.

Environmental Consequences: There are no known or expected T&E species in or adjacent to the affected environment as described above. Appendix A-5 includes the most up to date list of T&E as well as BLM Sensitive species for Montana. Some BLM Sensitive species could be in the area the analysis below is for BLM sensitive species since there are no known T&E species. Effects on these species would vary by alternative.

The vegetative treatment area is about 1,200 acres or about 5% of the North Moccasin range (36% of the BLM land). The treatment will reduce the basal area from 200+ sqft/ acre to 60-100 sqft/acre with the heaviest focus on late successional Douglas fir/ Lodgepole stands. Treatments in Ponderosa Pine/ Douglas fir stand treatments will lighter to maintain age diversity, snag replacement, and over all stand health. The treatments would not be uniform across the area.

The project calls for building of approximately 27,000 feet of roads considered "Permanent" and one mile of temporary roads. The project allows additional spur road construction but specifies that those roads would be reclaimed. The project also calls for the obliteration/reclamation on approximately 17,500 feet of existing unauthorized by used roads. Currently there is a network of ATV roads both authorized and not spread throughout the analysis area being used by recreationists. Obliteration of the 17,500 ft. of trails within the project area will block access to an additional ~11,000 feet of unauthorized but used ATV trails. Assuming a 400 meter disturbance buffer around roads, road building will impact and additional 312 acres of security habitat for wildlife with bedrock road affecting 236.7 acres, iron gulch affecting 68.3 acres and mason plum affecting 7 acres. Obliteration/ reclamation of unauthorized ATV trails will create 512 acres of security habitat for wildlife. 200 acres of security habitat would be gained.

Alternative 1: No Action- As referenced from the Fuels and Forestry sections of the document overstocking of the forest would lead to increased risk of high severity stand replacement wildfire due to a century of fire suppression. A decline in general forest health due to overstocking and bug infestation, accumulation of dead fall, loss of vegetation diversity, and conifer encroachment. There would be no short term effects due to the "no action" alternative. Long term effects to BLM sensitive species include:

- Eagles use a wide variety of habitats and are generalists. Conifer overstocking or encroachment would not benefit eagles or their habitat due to their wide range and use of multiple habitat types. Eagles would continue to move through or take advantage of scavenging opportunities as they arise.
- Veery and the Black-backed and Red-headed Woodpeckers would continue to forage and travel through the area, however, more suitable nesting habitat types are associated with the foothills and riparian areas of the North Moccasins.
- BLM sensitive bats utilize the area both seasonally and yearlong. Bats would continue to use snags for

diurnal and maternity roosts within the project area.

Unrestricted motorized access would continue on a network of ATV trails currently in place.

Alternative 2: Proposed Action - Vegetative Treatment- BLM Sensitive Species
The majority of wildlife will be temporarily displaced during implementation of the vegetation treatments. New "permanent roads", though limited to non-motorized travel, will likely increase human traffic and recreation to the area. A ROW application for the proposed iron gulch road is anticipated (See cumulative Impacts page 33). Habitat fragmentation through motorized access and potential for private development is a concern for all wildlife including BLM Sensitive Species.

- Bald Eagles and Golden Eagles. Short term displacement of winter resident birds would be expected due to treatment implementation. No active nests are known to occur in the treatment area but treatments potentially, though unlikely, could destroy nests that were not found during surveys. Long term treatments may increase desirability of nesting sites for eagles due to diversification of habitat types but unlikely due to better nesting locations near water in the foothills. It is expected that treatments would increase eagle utilization of the area due to increased visibility and foraging opportunity. Positive effects of treatments will be minor due to the wide range of eagles.
- The Veery and the Black-backed and Red-headed Woodpeckers are summer users of the area. The majority of treatments will occur in late fall and winter outside to the periods these species are expected in the area. Short term impacts will be low due to their seasonal use of the area. Immediately following treatments increased borers and engravers would be expected to come into the area. These would provide additional food sources for Black-backed and Red-headed Woodpeckers as they move through. Long term these species would likely benefit from increased species diversity due to treatments especially if deciduous shrubs and aspen can establish due to treatments.
- BLM Sensitive Bats including the Fringed myotis and Spotted bat are migratory and would not be expected in the project area during the project implementation. The Towsnsend's Big-eared bat would be expected in the area while the bats are in hibernation. These bats hibernate in caves and abandoned mines that are likely in the analysis area but have not been observed in the project area itself. Short term impacts immediately following treatments would be a reduction in diurnal roosting sites from cut snags. It is expected that Towsnsend's Big-eared bats have temperature requirements for maternity roosts, though poorly recorded (Hendricks and Kampwerth 2001). Opening up forest canopy to allow more sunlight on snags may make snags more

suitable for maternity roosts, conversely potential for wind throw would increase as well. Long term as snags weaken and fall new snag replacement will be limited due to fewer trees. Increased insects taking advantage of new meadows and vegetation types would provide additional food sources.

Mitigation:
Design features (pages 6-8) for bats would include keeping snags standing, leave a buffer of trees around cliffs, caves, and mine shafts if found in the project area, and detouring roads away from expected bat areas to limit disturbance. Entry into units with high probability of bats (cliffs, caves, large snag patches, etc…) will be limited to winter implementation only. Treatments will leave a 300 ft. buffer of trees around rock outcroppings to maintain temperatures of potential roosting areas.

Water Quality: All vegetation treatments and prescribed fire and fuel reduction activities must comply with the Safe Drinking Water Act of 1974 (as amended) and the Clean Water Act (CWA) of 1977(as amended by the Water Quality Act of 1987). The Safe Drinking Water Act establishes protective measures for culinary water systems by providing standards, which regulate allowable contaminant levels. The CWA requires agencies to develop and implement programs to control both point and non-point pollution.

Affected Environment:
The analysis area for the direct, indirect, and cumulative effects of disturbance associated with the preferred alternative is the Bedrock Canyon watershed, delineated where the outlet leaves BLM-administered land. This map is shown in Appendix A-4. Bedrock Canyon is an ephemeral/intermittent stream that is tributary to Duck Creek, which ultimately flows into Warm Spring Creek. The BLM-administered land is a very small portion of the Duck Creek and Warm Spring Creek watersheds, and it would not be a useful effects analysis given the scope and scale of the proposed projects. Therefore, the approach was to analyze the effects within the BLM-administered portion of the watershed to determine if any indirect and/or cumulative impacts would be present beyond the BLM portion of the Bedrock Canyon watershed.

The proposed action continues a permanent road extension and proposes vegetation treatments in the Bedrock Canyon watershed. There are 521 acres of BLM-administered land, which comprise the watershed delineated for analysis. The forest canopy is considered overstocked and the watershed contains a disproportionate amount of late-seral stage forest relative to forest conditions that would be expected under a more natural fire regime. Approximately one hundred eighty acres are proposed for treatment within the Bedrock Canyon watershed.

No water quality determination exists for Bedrock Canyon or its immediate receiving water, Duck Creek. Montana water quality standards require that no increases are allowed above naturally occurring concentrations of sediment or suspended sediment. According to the Administrative Rules of Montana, "naturally occurring means conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied."

Environmental Consequences:
The proposed action would treat approximately 180 acres in the Bedrock Canyon watershed through the removal of trees. When forest canopy is removed, there is a decrease in evapotranspiration and interception of snow and rain. This results in increased water quantity and runoff from treated areas. Erosion would be possible on disturbed areas associated with treatments. Sedimentation into stream channels from the treated areas would be minimized by Streamside Management Zones, which require a protective buffer around channels. These buffers act as filters for sediment generated from disturbed areas.

Increases in water quantity yield can indirectly cause erosion in downstream channels if the increases are large enough to cause morphological changes in the stream channel. Generally, one does not start seeing measurable increases in water quantity yield until roughly 25 to 30 percent of the watershed's forest canopy cover has been removed. Under the most aggressive treatment in the proposed action, forest stand basal areas would go from 200 square feet/acre to as low as 60-80 square feet/acre over the 180 treated acres. This would result in approximately 10 percent of the forest canopy cover being removed in the watershed ((180 treated acres/521 watershed acres)*(60 square feet/200 square feet) * 100). Therefore, there would unlikely be measurable indirect effects because of increases in water yield.

Under the proposed action, roughly 10,800 feet (two miles) of permanent road would be constructed into Bedrock Canyon within the analysis area boundary. Disturbance associated with road construction removes protective vegetative covers, decreases infiltration rates, and alters the timing and volume of runoff, which can lead to erosion. This indirectly results in sedimentation in streams and adverse effects to water quality, stream channel function, and aquatic habitat. Streams are most sensitive to receiving sediment from roads at crossings and where the road network is in close proximity to the channel (i.e. less than 100'). The proposed road would not cross any perennial or intermittent streams. It would cross five first-order, ephemeral drainages high in the watershed. Sediment entering these drainages could indirectly enter downstream drainages. However, because of the large distance to intermittent or perennial streams, measurable effects or adverse effects to water quality or beneficial uses of water would be unlikely.

The proposed road would result in roughly 3.5 acres of permanent disturbance. Generally, disturbance over one acre requires a stormwater discharge permit. However, roads constructed for silvicultural purposes are exempt from this requirement. If the road is not gated to preclude other purposes, a stormwater discharge permit would be required for construction of the road.

Wetlands/Riparian Zones: Executive Order 11990, Protection of Wetlands, requires federal agencies to minimize the destruction, loss or degradation of wetlands while preserving and enhancing their natural and beneficial values on public property.

Affected Environment:
No riparian-wetland areas are present in the proposed project area; therefore they would not be directly impacted. Indirect impacts to downstream riparian-wetland areas would primarily be a result of indirect increases in runoff and sediment, which would likely be immeasurable. Therefore, riparian-wetland areas are not carried forward for detailed analysis.

Climate Change:
Affected Environment: On-going scientific research has identified the potential impacts of anthropogenic greenhouse gas (GHG) emissions and their effects on global climatic conditions. These anthropogenic GHGs include carbon dioxide; methane; nitrous oxide; and several trace gases, as identified by the Intergovernmental Panel on Climate Change (IPCC). The general consensus is that as GHG emissions continue to rise, average global temperatures and sea levels would rise, precipitation patterns would change, and climatic trends would change and influence earth's natural resources in a variety of ways.

Montana's GHG emissions were recently updated and a forecast was made of expected emissions through 2020 (Montana DEQ 2007). The inventory indicates that Montana's electricity generation, heating needs, commerce, agriculture practices, and transportation needs accounted for 0.6 percent of the GHG emissions in the United States in 2005 or about 37 million metric tons of gross consumption-based carbon dioxide equivalents. The state's forests, croplands, and rangelands provides a vast terrestrial carbon sink that helps balance the state's emissions, however, a 14 percent increase GHG emissions from 1990 to 2005 moved Montana from a net carbon sink to a net carbon emitter.

Environmental Consequences: Potential impacts to natural resources due to climate change are likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool season plant species' ranges could potentially move north and due to the potential loss of habitat, or from competition from other species whose ranges shift northward, the population of some animal species could change. While many existing climate prediction models are global or regional in nature, the lack of scientific tools designed to predict climate change on local scales limits the ability to project potential future impacts of climate change on the specific area for this project. It is not possible to predict with any certainty site-specific effects on climate change relative to the Proposed Action Alternative.

3.1.2 Other Relevant Affected Resources

Fuels and Fire Management:
Affected Environment: Forest health issues (especially insect and disease damage) exist throughout the proposed project area. Besides insects and disease, other unhealthy conditions include: overstocking in the forest overstory and understory, conifer encroachment into Aspen stands and natural meadows, blowdown timber and suspended woody fuels, and a lack of herbaceous wildlife browse species. Almost the entire forested area is in a late successional stage resulting in increased fuel loadings.

The fuel structure of the overall forest is important to potential fire behavior. The overstocked nature of the forest helps form a continuous vertical fuel profile that facilitates ignition and burning of the tree crowns from surface fires. This would occur irrespective of the condition of the overstory canopy (whether live or dead). Beetle killed trees with dead foliage still attached could have the potential to increase the spread rate of a crown fire once it is established in the canopy. Where the understory contains no small trees or ladder fuels, crown fire could have a difficult time occurring.
Within the past century in the North Moccasin Mountains, reduced fire frequency in the forested settings have changed due to a century of fire suppression and the natural

role that fire has on the landscape. In addition, this area has been experiencing small-scale ecological disturbances. The western spruce budworm and mountain pine beetle have caused pockets of mortality. A report jointly prepared by the USDA Forest Service – Region 1 and the Montana Department of Natural Resources and Conservation (DNRC) and released in 2013 titled Montana Forest Insect and Disease Conditions and Program Highlights – 2013 (page 12), indicated that mountain pine beetle and western spruce budworm were the most conspicuous pests detected in Fergus County. In addition the report specifically highlights that damage to Aspen along with Armelleria (Root Disease) has been identified in the North Moccasin Mountains.

Implementing mechanical treatments and prescribed fire in the project area would decrease the closed-structure forest stands and increase the acres of open-structured stands. With the reduction in natural fuel loadings and stand densities, wild fire severity would also decrease. Forest biomass and species diversity of herbaceous and deciduous understory vegetation would likely increase. Reducing natural fuel loadings and ladder fuels would decrease the severity of a wildfire in the future and improve fire fighter and public safety.

In the event of an unplanned wild fire, current conditions could result in dramatic changes in fire size, fire severity, and landscape burn patterns.

Environmental Consequences: Under the No Action Alternative, hazardous fuels would not be treated and the fire hazard would remain at dangerous levels and increase over time. Dead and down fuels would continue to accumulate and contribute to horizontal continuity of the fuel bed as mixed conifer and other species continue through natural succession. Vegetation growth would sustain and/or increase stand density and ladder fuels which contribute to vertical continuity and accommodate movement of fire from surface fuels up into the crown of surviving trees and vegetation. In addition, high fuel loadings of large diameter fuels greater than 3" diameter can be expected to cause high fire severity (below ground effects) resulting in extensive resource damage.

Under the Proposed Action Alternative, access and firefighter response time would be enhanced due to new and better roads, fire/fuel breaks would be created and hazardous fuel loadings would be reduced by removing available fuels. Treatments would also break up the horizontal and vertical continuity of the fuel bed and reduce the ability of an unwanted wildfire to spread. The reduction in stand densities and ladder fuels would tend to cause wildfire to stay on the surface of the ground instead of transitioning to crown fire in the overstory trees. Lower flame lengths and fire line intensities at the fire's edge would enable fire suppression personnel to more effectively control a wildfire. Decreasing fire behavior would reduce the threat to residual trees in the project area, and adjacent private property and improvements.

Lands and Access:

Affected Environment: The project area is accessible via an existing two-track road which has been designated as a temporary public access route around the Kendall Mine, until completion of the mine reclamation process. Once mine reclamation is completed the access route will be a permanent exclusive easement that has already been recorded. A legal survey of this permanent easement will be completed prior to implementation of the proposed

action. This easement will not only allow for suitable public access into the North Moccasins but will allow for a full range of management and recreational activities in the future.

The Proposed Action Alternative will require using the permanent exclusive easement route through the Kendall Mine leading up to public land within the project area.

In addition to the existing road the BLM would construct approximately 27,000 feet of new permanent road in conjunction with the proposed action. These new roads will be available for use to the general public although seasonal and vehicle restrictions are likely to apply in order to avoid resource damage and conflicts with wildlife. Recent unauthorized off road use has resulted in several previously reclaimed trails being re-opened. Therefore, in addition to constructing new road the proposed action will obliterate/reclaim key sections of unauthorized roads and trails and therefore close approximately 17,000 feet to motorized use previously closed/reclaimed under EA# MT060-03-04.

Lastly, any temporary roads/landings/trails etc. required for implementation of treatment units would be obliterated, reclaimed and stabilized upon contract completion.

Environmental Consequences: Under the Proposed Action, road building, logging, and skidding operations all have the potential to cause erosion and soil degradation. Disturbed soils are likely become a seedbed for noxious and invasive plants. Improved access will lead to an increase in uses by the general public. Increased public use may result in an increase of unauthorized activities, (i.e. off road motorized uses).

No action – no new permanent roads would be built. The existing access road would continue to be used as is along with continued unauthorized motorized uses on roads/trails previously closed. No forest health treatments would occur due to limited access.

Recreation:

Affected Environment: Dispersed recreation in the 1,200 acre project area includes predominantly hunting and OHV driving. Other activities include hiking and camping. These areas are characterized as low use recreational areas where no developed or designated recreational sites exist.

Environmental Consequences: Under the no action alternative there would be no change in the way the public uses the land. As forest health continues to decline the threat of a stand replacing wildland fire remains high. A stand replacing wildland fire would result in an immediate negative impact on recreational use and a displacement of wildlife in the area.

Under the vegetative treatment alternative users may encounter heavy equipment operations and noise during treatment activities. Noise and activity may disrupt or have a short term negative impact on the users' experience. This alternative will create new routes available to the public and administrative routes to evaluate in travel planning. Also, illegal user created routes will be obliterated to reduce resource damage in the area.

Mitigation: Contracts for treatments are issued for no longer than 24 months with most work being completed in a much shorter time frame. A short term

displacement of the users experience due to treatment activity is less disruptive than the long term losses as a result of a catastrophic fire. Develop a maximum width restriction of 65" inches for OHV users at Gate A to reduce future resource damage. Remainder of gates closed to OHV users and open only for motorized administrative use unless otherwise decided in future travel planning.

Social and Economic:
Affected Environment: Lewistown, Montana, is a community with a population of approximately 6,000 people. Whether or not contracts associated with the Proposed Action Alternative are awarded to a local resident, it is expected that the contractor would conduct a significant amount of business in the local community. The local wood products industry would see a short term boost in production due to influx of additional timber. The adjacent landowner(s) would see a decrease in potential losses from a wildfire, insect and disease damage starting and spreading from the treatment area.

Environmental Consequences: The No Action Alternative has the potential to affect the adjacent landowner(s) when stand-replacement losses due to fire and/or insect and disease occurs, either through direct loss of property or through smoke effects on human health, private property, or quality of life. Current conditions are conducive to stand replacement losses, which creates a direct threat to adjacent private property. The amount and density of smoke and the concentration of particulates in the air would also be greater under the No Action Alternative, given the amount of existing fuels available in the crown, the understory, and on the ground.

Under the Proposed Action Alternative, the potential for stand replacement losses would be reduced and the threats to public safety, homes, businesses, and public buildings would be less hazardous than with the No Action Alternative. The social impacts of the treatment itself could involve truck traffic along with localized noise and dust.

Soils:
Affected Environment: The soil types in the project area were identified from the NRCS's Soil Survey Geographic (SSURGO) data set and the Web Soil Survey (WSS) website (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx). Soil surveys were performed by the NRCS according to National Cooperative Soil Survey (NCSS) standards and were conducted at the third order of detail. Pertinent information for review and analysis is from the Web Soil Survey (WSS) for the project area. Soil types were verified by field examinations conducted in September and October, 2015 by the Lewistown BLM Field Office Natural Resource Specialist. The intent of the field examination was to confirm soil types, evaluate anticipated impacts, and develop mitigation measures to reduce erosion and soil compaction and improve soil stability and salinity control anticipated from the proposed action.

Soil types within the project area formed in alluvium and/or colluvium and/or residuum weathered from igneous and sedimentary rock. Effecting rooting depths range from 20 to greater than 60 inches and correspond directly to soil depths that range from moderately deep (20-40 inches) to very deep (> 60 inches). All soil types are well drained. Permeability ranges from moderate to moderately rapid and available water holding capacity is low (3.1 inches – 4.6 inches). Runoff is rapid and the hazard of water erosion is high across all soil types. The soil types are not flooded or ponded and there is no zone of water saturation within a

depth of 72 inches. Shrink-swell potential is low. The predominant soil types formed under grasslands are located in three ecological site descriptions, they are: Silty (Si) 20"+ p.z., Clayey (Cy) RRU 46-C 10-14" p.z., and Shallow (Sw) 20"+ p.z. Salinity in the soil profiles range from nonsaline (0.0) to very slightly saline (2.0 mmhos/cm). Calcium carbonate ranges from a minimum of 0 percent to maximum levels of 50 – 60 percent in the top 40 inches of the soil profile. Organic matter content in the soil surface horizon ranges from 1 to 3 percent. The majority of the soil disturbance associated with the proposed action will occur within the following four soil map units (SMU): 124 - Hughesville-Skaggs flaggy loams, 15 to 60 percent slopes; 168 - Mocmont very gravelly loam, 15 to 60 percent slopes; 238 - Tigeron very gravelly loam, 15 to 60 percent slopes; and 262 - Whitecow-Hughesville complex, 20 to 60 percent slopes. Appendix A-6 provides a brief description of the major soils that occur in the SMU. Descriptions of non-soil and minor SMU components are not included. Table 2 provides a summary of project relevant Soil Map Unit Ratings and Interpretations (USDA-NRCS, 1998).

Table 2 Map Unit Ratings and Interpretations (USDA-NRCS, 1998)

Soil Map Unit	Project Area (%)	New Road (%)	Hazard of Off-Road or Off-Trail Erosion		Soil Rutting Hazard		Construction Limitation for Haul Roads and Log Landings		Potential for Damage to Soil by Fire	
			Rating Class	Limiting Feature(s)	Rating Class	Limiting Feature(s)	Rating Class	Limiting Feature(s)	Rating Class	Limiting Feature(s)
124	1%	0	Severe	Slope/ erodibility	Severe	Low strength	Severe	Slope	Moderately susceptible	Water erosion
168	78%	60	Severe	Slope/ erodibility	Slight	Strength	Severe	Slope	Highly Susceptible	Content of rock fragment
238	11%	40	Severe	Slope/ erodibility	Slight	Strength	Severe	Slope	Highly Susceptible	Content of rock fragment
262	10%	0	Severe	Slope/ erodibility	Severe	Low strength	Severe	Slope	Moderately susceptible	Content of rock fragment

The four dominant soil types are forested covered with undecomposed and decomposed needles, twigs, cones, and leaves at least two inches thick or understory vegetation with little to no exposed bare mineral soil.

Environmental Consequences:
Selection of the No Action Alternative would continue past management practices. There would be no additional impacts to soil resources beyond what currently exist under this alternative; however, insect and disease damaged timber would remain and likely increase the potential for a high-severity wildfire. High-severity wildfires often have major effects on soil process which could lead to increased runoff, erosion, and reduced land stability (Neary et al 2005). Estimated sediment delivery amount after a high severity wildland fire using the Forest Service Water Erosion Prediciton Project (FSWEPP) Erosion Risk Management Tool (ERMit) are 2.63 ton/acre the first year, .72 ton/acre the second year, and .08 ton/acre the third year. Approximately 89 percent of

the soil types in the project area are susceptible to fire damage (Table 2); therefore, soil quality would be directly and indirectly affected by fire and fire suppression efforts in the event of a high-severity wildfire.

Selection of the Proposed Action Alternative would result in varying degrees of soil disturbance severity and extent throughout the 1200 acre project area. Approximately 5.1 miles of permanent new roads and approximately 2 miles of temporary roads/skid trails would be constructed to access forest management units; 3.2 miles of existing roads and trails would be obliterated and stabilized; timber would be removed from approximately 350 acres of the project area by commercial and non-commercial thinning practices; and treated with prescribed fire to improve forest health conditions.

The combination of road construction, road obliteration, ground and cable based logging operations, and prescribed burning would expose mineral soil and have the potential to compact, rut, mix, and displace soil; remove understory vegetation, litter, and duff; reduce gas exchange; and disrupt nutrient cycles. These actions will impact soil quality by altering dynamic physical, chemical, and biological soil properties.

Construction of 5.1 miles of permanent roads and 2 miles of temporary roads/trails will results in exposer of bare soil, placement of unconsolidated material on the slopes, soil compaction, destruction of soil aggregation, interception of subsurface flow, and concentration of surface runoff, all of which increases the potential for erosion (Rice, Rothacher, and Megahan 1972) across 2.3 percent of the project area. Surface erosion from roads, generally is highest during the first year following construction and decreases rapidly with time (Megahan and King, 2004). The initial high road erosion rates following construction often are attributed to erosion of unconsolidated fill material. The long-term source of sediment is from the cutslopes, road tread, and ditch systems of permanent roads. (Megahan and Kidd, 1972). A large body of research shows that much of the erosional impact of roads is manageable through proper land-use planning, location, design, construction, maintenance, and road closure (Megahan and King 2004).

Implementing the design features, mitigation measures, and Montana's Water Quality BMPs and road BMPs outlined in the Judith Resource Area RMP (1994) would effectively reduce erosional impacts (Seyedbagheri, 1996).

Temporary roads/trails would be built to minimum standards and reclaimed/obliterated within 1 to 3 years following construction. Due to the largest percentage of soil loss occurring within 1-2 years after disturbance, erosion control devices placed on temporary roads/trails would reduce sediment yields from these areas. Reclaiming and/or obliteration temporary roads would entail de-compaction (sub-soil ripping) and seeding of road and trial surfaces to accelerate the natural recovery of soil properties, which is usually slow and relies on wetting drying, frost activity, animal activity, and root growth (Kolka and Smidt 2004). An initial increase in sediment yields would be expected to decrease exponentially with time as vegetation establishes. Vegetation cover and infiltration rates will increase; however, some compaction of surface soil particles may persist 5 years after the reclamation activities (Croke, Hairesine, and Fogarty 2001).

Approximately 3.2 miles of existing roads would be obliterated, thus removing unauthorized traffic-induced compaction and promote natural recovery of soil properties. De-compacting treated road surfaces in combination with mulch application from forest harvest residues will increase infiltration capacities, mitigate soil surface sealing, and promote re-vegetation. The short term disturbances of road removal can result in temporary increases in sediment loss; however, a long term decrease in surface runoff, decreased sediment production, and decreased soil bulk density across .6 percent of the project area would be expected (Switalski and others, 2004).

Approximately 89 percent of the soil types within the thinning treatment units are moderately susceptible to degradation and compaction. Therefore, the most obvious and principal form of soil impacts as a result of commercial and non-commercial thinning of 350 acres within the project area is compaction. Compaction will increases soil bulk density, decrease water and air movement into and through the soil, restrict root growth, and increase surface runoff and erosion (Reeves and others, 2011). The degree of change in soil attributes as a result of compaction will vary depending on soil types, climatic regime, soil moisture, organic matter, time of harvest, equipment used, weight of equipment, and number of machine passes. The design feature of the proposed action that limits ground based equipment operation to times when soils are in a condition that avoids severe rutting and compaction will minimize impacts to soil resources as a result of compaction.

Ground based equipment operations are planned where suitable soils occur and on slopes 40 percent or less. Approximately 44 percent of the 350 acres are suitable for tractor-yarding, which results in an average of 21 percent bare ground (Rice and others, 1972). Tractor operations would decrease existing vegetative cover and organic matter, exposing soil to erosion, as harvesting and skidding occurs; however, slash material would be ground into the soil through skidding process. This slash would act as mulch protecting the soil from erosion processes and could serve as a base to distribute weight and lessen compaction from ground-based equipment (Graham and others, 2004). Approximately 56 percent of the 350 acres are suitable for cable-ground yarding, which results in an average of 13 percent bare ground (Rice and others, 1972). Silvicultural prescriptions are expected to disturb approximately 29 percent of the soil surface within the project area and may expose 16 percent bare soil across the three thinning units. The spatial extent and severity of soil disturbance and/or bare soil is expected to be variable across the thinning treatment units and therefore would diffuse runoff to limit overland flow and minimize sediment movement. Since surface erosion depends primarily on extent and continuity of bare areas, soil loss from the timber treatment units is expected to be slight (Rice and others, 1972).

Approximately 35percent bare soil would be exposed where encroaching conifers are removed immediately adjacent to Aspen stands. An initial increase in sediment yields from the exposed bare soil would be expected to decrease exponentially with time as vegetation establishes. As vegetation establishes, infiltration rates would increase, facilitating the expansion of Aspen and other hardwoods and shrubs.

Impacts to soils would be further minimized if timber harvest operations were conducted during the winter months when soils were frozen and/or covered with snow. Optimal

snow pack and temperature conditions for ground-based winter harvesting help preserve organic horizons, water infiltration, root structures, and reduce the occurrence of soil compaction and rutting (Reeves and others, 2011).

The proposed action includes the use of prescribed fire throughout the 1200 project area. The removal of ground litter and timber slash may result in increased erosion potential. Excessive heating in areas may result in the formation of a water repellent barrier in the soil. The severity of water repellency is correlated with burning temperatures and may impede vegetative recovery (Rice and others, 1972) which would further contribute to erosion. Rice and others noted that erosional effects of prescribed fire decline within 1 to 4 years as understory vegetation reestablish. Prescribed burning has variable effects on many soil attributed including soil nutrient and carbon pools, soil respiration, and microbial functional diversity. (Erickson and White, 2008).

All of the soil types within the project area have a high restoration potential and are considered resilient. Implementing and adhering to the design features, mitigation measures, and Montana's Water Quality BMPs for Montana Forests (MSU Extension, 2001) would mitigate the short-term extent and severity of soil disturbance, the potential for prolonged compaction, and long-term effects to soil quality throughout the timber treatment units.

Mitigation: Leave 5 to 10 tons per acre of downed coarse woody debris greater than 4 inches in diameter following slash reduction on all treatment areas to help re-establish soil productivity (Graham and other, 1994).

Limit burning of slash/landing piles to winter conditions to minimize detrimental heating of soils.

Restrict OHV motorized traffic on the Mason Plum Road to less than 65" wide beyond gate "A" on attached Map. Motorized OHV use beyond gate "B", "C" and "D" would be limited to administrative use only.

Vegetation:

Affected Environment: The Natural Heritage Tracker was queried. No Threatened, Endangered, Candidate, or BLM sensitive plant species are listed within the project area. The project area consists of approximately 979 acres of forested vegetation, and 78 acres of meadows with conifer encroachment. For a more detailed description of forested areas, see the Forestry section above. Meadows are dominated by grasses such as Timothy, Idaho Fescue, Arrow leaf Balsamroot, along with shrubs such as Wild Rose, Snowberry and minor amounts of Chokecherry.

Environmental Consequences: Under the No Action Alternative, no changes would occur to vegetative communities. Overstocked forests would continue to experience declining health and insect and disease infestations would continue to increase, likely expanding into other areas. Conifer encroachment into Aspen stands would continue; thereby threatening to eventually replace existing Aspen stands. Grass meadow vegetation would remain unchanged. However, Conifer encroachment would continue to occur, resulting in a reduction in meadow size.

Under the Proposed Action Alternative, forest treatments would reduce tree density; thereby opening and/or removing the forest canopy in some areas. As this occurs, there

would be a flush in herbaceous and shrub vegetation. This would be a temporary shift - as conifers would recolonize these areas over time with young healthy trees. These trees would be more resistant to disease and insect infestations than the current communities.

Conifer encroachment in Aspen stands would be reduced, allowing Aspen stands to remain healthy, and potentially expand. Conifer encroachment in meadows would be reduced, preserving and potentially expanding grass meadow vegetation.

To implement the Proposed Action Alternative, roads, skid trails, and log landings would be created. In these areas, vegetation would be altered and potentially removed. While these surface disturbances would be temporary, changes in vegetative composition would occur. Disturbed areas would potentially be subject to surface removal or alteration. Additionally, all sites where heavy equipment is used would be subject to compaction. This could result in decreased plant performance, vigor, mortality, and potential shifts in species composition. Disturbed sites would be prone to invasion of non-native plant species. Annual bromes are currently present in the area and could increase on these sites. These impacts would be expected to be short term. The implementation of Montana BMPs, minimized surface disturbance, and timely reclamation/obliteration would improve vegetation recovery on disturbed sites.

Visual Resources:
Affected Environment: BLM manages lands with inherent scenic value. The BLM uses a Visual Resource Management (VRM) system to inventory and manage visual resources on public land. The primary objectives of VRM are to help identify visual (scenic) values and to minimize visual impacts on BLM land from proposed projects and management activities. The VRM classification system uses four classes to describe the different degrees of modification allowed to the landscape. VRM classes are based on a process that considers scenic quality, sensitivity to changes in the landscape and distance zone. The four VRM classes are numbered I to IV; the lower the number the more sensitive and scenic the area. The proposed project is located in VRM Class III.

VRM Class III Objective is defined as follows:

Class III Objective – The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Key Observation Points (KOP's) were located at the following sites:

- KOP 1: Saddle is located in the Section 25, T18N, and R17E.
- KOP 2: Mason Canyon Road is located in the Section 31, T18N, and R17E. This KOP is located at the boundary of BLM and private on Mason Canyon Road.
- KOP 3: S Kendall Road is located in Section 28, T17N, and R18E. This KOP is located near the intersection of Highway 81 and S. Kendall Road.

KOP 1: Saddle was chosen because of the potential to view the treatment from

Highway 81 and the Plum Creek County Road.

KOP 2: Mason Canyon Road was chosen since it is an existing road that connects to a proposed route in the treatment plan.

KOP 3: S Kendall Road was chosen for the length of time in view when people turn off the highway. There is also a higher likelihood of a driver stopping at this location.

Forest Health treatments are likely to attract more attention at KOP 1 and 2 because of the close proximity. However, KOP 2 has the highest likelihood of attracting attention. Specifically, the portions with contrasting linear features (roads and cable lines) on the southwest facing slopes will attract attention of the casual observer if not properly mitigated.

Mitigation:
1. When creating logging routes, consider topography and vegetation screening to hide the new routes.

2. Where treatments take place, leave trees and "islands of trees" along with "feathered" edges and "stringer trees" will help reduce the abrupt edges of cutting units. The bare ground effect of treatments can be mitigated by leaving scattered large wood debris, rocks, etc. to produce a "roughening" of the surface.
3. Reclamation of the cable lines treatment must occur. The cable treatment creates vertical linear features that contrast with the surrounding environment. Reclamation of the cable lines must include utilizing downed vegetation and understory vegetation in the adjacent area by placing it over the linear feature to disguise the contrast.

4. Reduce or eliminate the "straight line" effect of roads by reclaiming any new road construction upon completion of treatments. Screening roads and trails by leaving taller vegetation (shrubs, trees and snags) that extend from below fill slopes to above cut slopes. Road reclamation would involve roughing up the road, seeding the road with native vegetation, removal of cut slopes and berms, and placement of large objects, such as down trees and boulders to restrict motorized access. If natural tree seedling establishment does not occur with 3-5 years recommend planting trees where reclaiming roads are near open OHV routes.

5. Edges from treatment units would meander and follow natural topography so as to blend more with the natural landscape. These enhancement or re-establishment efforts would reduce the amount of time needed for recovery by immediately weakening the contrasting effects or impacts of the project activity. The greatest contrasts to form, line, color, and texture, if not mitigated, would be in the zone between the treated or salvaged acreages and the adjacent heavily timbered slopes.

6. Logging equipment must not be used during extremely wet conditions to reduce the level of impact to the resource.

Under the No Action alternative, the short term forest visual character of the area would be maintained. Users who enjoy the densely stocked forest would not see any immediate change. However as forest health continues to decline the dense canopied conditions will change to a more open appearance. The eventual loss of timber due to a severe wild land fire would include severe blackening of the landscape and a large amount of blackened deadfall. If the proposed treatment were completed, short-term adverse visual impacts would

exist until slash piles are burned and the burn piles are dispersed and seeded in. The proposed project would eventually blend into the surrounding visual resources in the area by mimicking already existing meadows and add to the hardwoods and forest diversity. In addition, there would be a decrease to the potential negative visual impacts associated with a stand-replacement fire. Silvicultural prescriptions specify leave tree retention as single tress and groups of trees and are designed to maximize conifer as well as hardwood and shrub growth.

Woodlands/Forest Health:
Affected Environment: The total project area encompasses approximately 1200 acres of forested land. Within the boundaries of the project area, (but not included in the proposed action) there is approximately149 acres of privately owned patented mining claims, two of which have structures. The forest is made up mostly of an overstory of Douglas-fir and Lodgepole pine along with Ponderosa Pine on the drier and more exposed aspects. Minor amounts of Aspen and shrubs exist in the wetter drainages and throughout the cooler aspects.

Forest health issues such as overstocking in the forest overstory and understory, conifer encroachment into Aspen stands and natural openings and ridge tops along with insect and diseases are prevalent throughout all stands. There are also areas of scattered blowdown timber and suspended woody fuels, along with a lack of herbaceous wildlife browse species. Almost the entire forested area is in a late successional stage resulting in increased fuel loadings.

Specific stand types within the project area are illustrated by the map in Appendix A-2. Forest descriptions and proposed treatments are further described as:

<u>Encroachment</u>
78 acres
Stand Description: Throughout the project area (mostly along ridges and the drier aspects) there are areas that were historically more open. These areas are characterized by single trees and small clumps of mature to over mature Ponderosa Pines (PP) along with native grasses, bunch grasses, forbs and shrubs. However, due to a lack of natural disturbances (fire) these once open areas are being encroached upon by both Ponderosa Pine and Douglas-fir. The encroachment has choked out the sprouting and re-sprouting of wildlife forage species.

Stand Treatment: Some areas that exist are functioning properly and in no need of treatments. However, in most areas the treatments would be mainly hand cutting and prescribed fire. However, some areas may lend themselves to being treated by mechanical equipment in conjunction with adjacent commercial operations. Specifically, treatments are focused on cutting all Douglas-fir (less than 100 years old) that has encroached into the historically open areas. Cut material would primarily be lopped and scattered in preparation for burning. Ideally, broadcast burning is recommended to facilitate regeneration and re-sprouting of grasses, forbs and shrubs. However, due to control issues, access and proximity to private lands some piling and burning will likely occur.

Some Ponderosa Pine in all age classes would be targeted for retention. The target stand would be multi-age classes occurring as single trees and clumps. However, the overall stand density would have a target basal area of 10 ft^2/acre or less. Selection of younger, healthier trees would serve as replacements for older trees that would eventually die and become suitable snags.

Mixed Conifer Stands (DF and LPP)
402 acres
Stand Description: Conifer stands are predominantly Lodgepole Pine with scattered dominant and co-dominant Douglas-fir along with very few Ponderosa Pines. Basal areas are well above desired target levels; reaching as high as 200 ft^2/acre in some portions of the stand. The overstory is predominantly Lodgepole pine, 100+ years old along with Douglas-fir occurring as seedlings and up to 200 years old. The understory is dominated by Douglas-fir regeneration occurring in clumps and scattered trees. Based on ocular estimates, mountain pine beetle has been active throughout Lodgepole pine stands; resulting in pockets of older trees dead or dying. Western spruce budworm is also prevalent in the Douglas-fir.
Stand Treatments: Treatment types would vary due to the high variability of mortality and differences in species composition. However, general treatments are primarily focused on reducing stand densities with priority given to removing all insect and disease infested tree species. Healthy dominant and co-dominant Douglas-fir would be left. The target stand would be an uneven-aged stand comprised predominantly of an overstory of Douglas-fir. In pure Lodgepole pine stands, treatments would focus on small patch cuts, or larger cuts with selected leave trees or groups of trees. In addition, a minimum of 10% of any specific treatment unit would be left in "islands" to provide wildlife habitat in the forms of hiding, bedding, and thermal cover. Standing, large snags would also be targeted for retention to provide wildlife habitat.

Opening up dense timber stands would promote regeneration of Lodgepole pine, reduce western spruce budworm infestation, and facilitate a healthier understory of native grasses, forbs, and shrubs. Treatments such as prescribed fire or the use of equipment that provides for scarification of soils is recommended to help provide nutrient recycling, prep the seedbed, and promote regeneration.

2004 Treatment Areas
156 acres
Stand Description: These areas were treated previously in 2004 as a result of wind and insect damage. The areas have naturally regenerated with a mix of LPP, DF and PP. Most seedlings are 2-4 feet tall. The entire area has also re-vegetated to native grasses, shrubs and forbs along with increased patches of Aspen.

Stand Treatments: Within the next few years pre-commercial thinning (PCT) should be considered in order to manage species mix and stand densities. Commercial removal of some of the overstory may be considered in order to help maintain desired forest health conditions. Prescribed fire (understory burns) may also be used in order to help facilitate desired shrub and aspen growth/expansion.

Mixed Conifer Stands (PP and DF)
421 acres
Stand Description: This is a primarily west facing aspect that is characterized by a mostly mature stand of Ponderosa Pine and Douglas-fir along with scattered pockets of Limber Pine and Lodgepole Pine. Remnant Aspen stands exist in some draws but have or are declining in health due to the overstocked adjacent conifer stands. Mountain Pine Beetle has attacked and killed pockets of both LPP and PP in some areas. Ground cover is mostly a layer of pine needles and common juniper. The increased ground, cover along with lack of sunlight, is inhibiting any growth and sprouting of native grasses/forbs and shrubs.

Stocking levels of trees are approaching 200 ft^2 of basal area/acre in some areas.

Stand Treatments: Commercial and non-commercial treatments would focus on removing LPP and thinning DF and PP through selective cutting. The target stand would be no more than 120 ft^2/acre of basal area favoring uneven age classes of PP along with lesser amounts of DF.

Environmental Consequences (all treatments): Implementation of the Vegetation Treatment Alternative would result in varying levels of thinning of the overstory, as well as the understory. Road uses would be susceptible to some erosion until stabilization occurs and skid trails may be readily visible until re-seeding and natural re-sprouting of shrubs and forbs. Smoke from prescribed fires cause some short-term impacts to local residents. Commercial and non-commercial activities will likely displace wildlife for a short period of time.

Mitigation: Silvicultural prescriptions have been prepared for all stands based on recent walk thru inventories. All prescriptions are geared toward a more naturally fire resistant stand while maintaining visual quality for recreational users, quality wildlife habitat and old growth characteristics of the forest. Trees would be marked for cut/leave to meet specific objectives for stand density. Shrubs and forbs would increase due to increased sunlight and soil scarification from prescribed fire. The threat of a stand replacing fire will be reduced.

Any prescribed burning would be implemented on a very good to excellent smoke dispersal day to limit smoke impacts. Prescribed fires require the approval from the Montana Department of Health and Environmental Science, Air Quality Bureau. Compliance with state regulations and local smoke management programs is mandatory and would minimize the effects of temporary increases in particulates, carbon monoxide, and decreased visibility during prescribed burning. Soil scarification thru skidding and prescribed fire will provide a seedbed for desirable conifers and hardwoods. Additionally treatments will increase shrub and forbs growth throughout.

The purchaser is required to enter into a contractual agreement with the United States Government, post necessary bonds and conduct work in a professional workmanlike manner in order to meet the land management objectives. The contract would be closely administered by an Authorized Officer for compliance.

Wildlife:

Affected Environment: See affected environment section under the T&E Species section on pages 11-12. As stated above the analysis area is limited to the North Moccasin range due to its isolation from the other mountain ranges and the wide range that most species expected in the project area can utilize.

Treatments will focus primarily on late successional Douglas-fir stands. Treatments in the drier Ponderosa Pine/Douglas-fir stands will be lighter in order to maintain age diversity and snag replacement while still maintaining over all stand health. The treatments would not be uniform across the area.

Five different landowners own 141 acres of private land (mining claims) within the project area. There are two seasonal cabins being used regularly on these partials. The main BLM access road crosses 33 acres of private land controlled by three landowners. An old logging or mining road exists on

private property. This road has the ability, with proper private easements, to give access to the two landowners; their only access.

Approximately 27,000 feet of roads considered "Permanent" would be built. Obliteration/ reclamation would occur on approximately 17,000 feet of existing two track roads. Obliteration of these trails within the project area will block access to an additional ~11,000 feet of unauthorized but used ATV trails. Assuming a 400 meter disturbance buffer around roads, road building will impact an additional 312 acres of security habitat. Obliteration/ reclamation of unauthorized ATV trails will create 512 acres of security habitat for wildlife; security habitat increase by 200 acres.

Big game species and game birds such as elk, mule deer, moose, and blue grouse could be found within the project area. Montana FWP 2015 surveys show that elk numbers are 20-50% above objective in hunting district 412. Mule deer and Whitetail deer populations have been rising for the past couple years since there was a decline in populations due to an outbreak of Epizootic Hemorrhagic Disease (EHD) in 2013. The area is considered to be used year round by these species and observations from multiple site visits during all four seasons have shown that the area serves mostly as a travel corridor for mule deer and elk. The majority of use is along ridges in close proximity to previous treatment areas and the mine restoration area. Various species of birds have been observed in the proposed project area including cavity nester such as the hairy woodpecker and chickadees, raptors such as red-tailed hawks, and song birds such as jays, nutcrackers, and robins. See the last sections of appendix A-5 for a table of wildlife species classifications.

Environmental Consequences: Alternative 1: No Action- As referenced from the Fuels and Forestry sections of the document overstocking of the forest would lead to increased risk of high severity stand replacement wildfire due to a century of fire suppression. A decline in general forest health due to overstocking and bug infestation, accumulation of dead fall, loss of vegetation diversity, and conifer encroachment.

There would be no short term effects due to the "no action" alternative being implemented. Long term foraging habitat for big game, other generalists, and their predators would decline. The area would continue to be used as a travel corridor between areas of better habitat and for security from hunters during hunting season. Motorized access would remain on a network of authorized and user created ATV trails (~11 miles) currently in place. Security habitat would remain unchanged from current levels due to no change in road status or use.

Forest specialists such as hawks in the accipiter family, various small mammals and some song birds, habitat would expand with forest encroachment. The chances of stand replacement fire would remain the largest threat to habitat. Due to the unpredictability of wildfire a determination of likely hood of fire occurrence cannot be analyzed, however due to fuel loading, inaccessibility for suppression crews, and terrain; the chances of a fire being high intensity stand replacement are high. Recovery would take decades as observed from the 800 acre fire to the northeast.

No road building would benefit the majority of species by limiting human traffic to the area; however the network of unauthorized ATV trails would continue to be used by recreationists.

Alternative 2: Proposed Action - Vegetative Treatment; Short Term: During treatment temporary displacement of most wildlife using the area in the late fall and winter would be expected. Tree damage and cutting can cause an influx of wood borer and engraver species of insects the next summer. These insects and damage to leave trees could cause some additional mortality to leave trees. These insects create a food source for birds and small mammals, slash piles would provide cover as well until the slash piles are burned. Direct mortality to small mammals in piles will occur when piles are burned.

Long Term Effects: Treatments will increase understory production of grass and forbs through opening up of the overstory and ground disturbance. Removal of encroaching conifers from natural montane meadows and aspen stands will maintain and increase plant species diversity. These treatments will also create a forest structure resistant to stand replacement fires. Fires that do occur will burn more "naturally" due to reduction of fuel build up caused by a century of fire suppression. Understory burning and soil scarification from mechanical and skidding operations will make nutrients available and remove litter accumulation. These actions are expected to stimulate aspen and deciduous shrub growth. Expansion of vegetation diversity, specifically deciduous shrubs, will increase and diversify foraging opportunities for many species and their predators. As shrubs and aspen increase some loss of cover from conifer removal would be replaced. Habitat will improve for many species including big game, game birds, and other edge favoring generalists, however, full benefit will not occur until aspen or shrubs can replace the loss of cover.

Habitat will decline for accipiter hawks, some owls, and other forest specializing migratory song birds and small mammals. These species will see a decline in foraging and security habitat due to the loss of forest structure, decreased cone production, competition for remaining suitable habitats, and increased competition with generalist species or being preyed upon by generalists that may move in as a result of treatments. Some individuals will be permanently displaced or will no longer use the area. Hiding cover for both generalists and specialists will decline and regeneration of aspen and deciduous shrubs will not replace the net loss of cover.

Road Construction and Access: Short term impacts of road construction would be the same as the vegetation treatments. Long term effects of road construction and increased ease of access poses the biggest long term impact to wildlife. The vegetative treatment area is about 1,200 acres (36% of the BLM land) and about 5% of the whole North Moccasin range as defined in the T&E section. The project calls for building of proximately 27,000 feet of roads that will remain in place as "Permanent". The project also calls for the obliteration/reclamation on approximately 17,000 feet of existing unauthorized two track ATV roads. With no travel management decisions in place the roads are used. Bedrock road will not be open to motorized access. Mason plum road will be closed at gate B and width restrictions will be in place at gate A to reduce impacts to resources and wildlife. Motorized access should be limited with the obliteration of ATV trails within the project area. Trail removal will block access to an

additional ~11,000 feet of trails currently used by ATV users. Increased knowledge of recreational opportunity provided by easements and roads will increase human recreational use such as hiking, biking, horseback riding, and ATV access where it is currently authorized.

Existing motorized access currently in the project area and developed private inholding has already impacted 757 acres of security cover with an additional 2,000 acres from authorized and unauthorized ATV trails. (Assuming a 400 m buffer from utilized roads) Road construction will impact and additional 244 acres of security habitat for wildlife with bedrock road affecting 236.7 acres and mason plum road affecting 7 acres. Obliteration/ reclamation of unauthorized ATV trails will create 512 acres of security habitat for wildlife. 268 acres of security habitat would be gained. Iron gulch road impacts are analyzed in the cumulative impacts, (pg. 33) since this road will only be permanent if a ROW application is submitted. Wildlife tolerance of human presence differs between species. Some animals such as Mountain lion, Bobcats and Goshawks tend to be solitary and do not tolerate regular human presence. Long term impacts of these roads will likely be seasonal displacement of these species from these areas. Hunted species such as big game and game birds will move into the area to take advantage of vegetation treatments, but will be displaced seasonally due to hunting pressures from roads. Commonly these species move to private land with intact habitat that act as safety zones due to limited hunter access. Human tolerant species like some small mammals and birds will see little change.

Road building could also increase the potential for development of private inholdings due to easier access. This has happened on past projects and is discussed below in the cumulative impacts, page 33.

Mitigation:
Design features included for wildlife (page 8) included:

- Bedrock road would be restricted to non-motorized uses by the general public. Once re-entry into project area is no longer foreseeable or needed, the road or a portion would be reclaimed:
- Promote regeneration of deciduous shrub and aspen patches;
- For forest favoring specialist species found within the projects area: Exclude areas from treatment that boarder or are adjacent to SMZ's to promote keeping "patches" the largest size possible;
- For bats and cavity nesters; keep large (12 inch DBH and 20 ft. tall or taller) and all inhabited snags. The project should maintain an average of three snags per acres to be used as roosts and nesting sites;
- If desirable snags present safety hazard to crews in the area consider excluding treatment as opposed to cutting snags. Consider this especially if the snags are in a "patch";
- Inventory for raptor nests of any kind and if they are found in the unit, leave a .25 mi of untreated area around the known nest locations;
- Project area will be defined into units and consultation with the project biologist will help determine timing of individual unit entry, road entry, and seasonal or timing restrictions to reduce impacts to

nesting birds, bats and other wildlife.

3.2 Cumulative Impacts
Related BLM Activities and Anticipated Cumulative Impacts

All past, present and reasonably foreseeable future impacts have been addressed and discussed throughout this document by resource.

Under the No Action Alternative, there would be no cumulative impacts related to Forest Health treatments. However, even without treatments one adjacent landowner has approached BLM about a proposed new road and subsequent ROW to a seasonal cabin. Further discussion regarding the potential ROW is below in section 3.3.

Even without the proposed forest treatments the cumulative impacts associated with a stand replacing wildfire and/or the continuation of the insect and disease outbreak on BLM could be devastating not only to the BLM parcel but to the surrounding lands. Especially, of concern would, be the loss of vegetation (from wildfire) that would most likely result in immediate and excessive soil erosion, soil sterilization, intrusion of non-native plant species, increased decline in forest health, and displacement of wildlife due to loss of habitat. In addition, the threat of loss of private property due to uncontrolled wildfire and/or loss of forest habitat immediately adjacent to the project area is inevitable.

Under the Proposed Action Alternative, there would be a short term displacement of wildlife due to increased treatments and road construction activity. There would also be localized impacts to soils such as compaction and erosion. These impacts would diminish over time as vegetation recovers. BMPs and project design features would minimize soil impacts. Scenic and recreational values could be temporarily degraded until re-contouring and stabilization of cut and fill slopes occur and native grasses, forbs and shrubs re-establish themselves. There would be some minimal fire scaring associated with the prescribed fire treatments. In addition to the restoration projects that have occurred, are occurring (or planning to occur) on the DNRC and adjacent private property, treatments on the BLM project would help increase the overall successful restoration of the landscape within the North Moccasins mountain range. There are no anticipated long term cumulative impacts associated with the project.

3.3 Description of Relevant Past, Present, and Reasonably Foreseeable Future Actions Not Part of the Proposed Action.

Scattered tracts of private land have had varying degrees of commercial and non-commercial timber cutting in the past 15-20 years. Approximately six years ago, the Montana Department of Natural Resources (DNRC) had a timber sale in section 36, T18N, R17E. The BLM also had a salvage timber sale within the current project area approximately 10 years ago. These areas of past cutting have re-vegetated with grasses, shrubs, forbs, and trees. There has been no recent commercial timber harvest or other significant forest health activities other than incidental, personal uses such as post and pole or firewood.

At least one adjacent private landowner has indicated he may build a summer cabin on a patented mining claim within the project area boundaries. The potential building site is currently accessible via a public access road and could occur with or without implementation of the proposed action.

Habitat fragmentation and loss is one of the biggest impacts to wildlife species.

Development of recreational cabins on private inholdings within the project area has already occurred and it is reasonable to assume it will occur in the future, although terrain and landscape of the private inholding would limit development opportunity. Existing roads and proposed permanent roads grant easier access to these private inholdings on BLM land thus make private development more economically feasible to the private land owner.

A ROW request from an accessible 19 acre private parcel through BLM to a ~36 acre private parcel is an anticipated connected action. Currently there is an existing accessible cabin on private land adjacent to the project area. It is expected that the landowner is going to request a ROW across the iron gulch road following implementation of the treatments. The iron gulch road is 5,133 feet long and accesses 28% of the proposed treatment area. Assuming a 400m disturbance buffer off the Iron Gulch road, 68 acres of additional security cover would be impacted by this ROW as opposed to the current access road. If the current road access was to be unused or closed 87 acres of security cover would be gained with a net gain of 19 acres of security habitat. The landowner originally had requested an application for a ROW off the existing road during the planning phase of the project. The design of the proposed iron gulch road will result in a much more stable road location and suitable for long term management with minimum maintenance. Currently the landowner accesses his property through a road located in a drainage bottom, from the southwest crossing adjacent private property and state land. The road use, if the ROW is granted, would be expected to be seasonal due to snow accumulation and light with only one landowner accessing the property.

Currently five private landowners control ~141 acres of private mining claim inholding in the project area, including the 36 acre partial analyzed above. Roads are in place to access all these acres currently. The main existing BLM road crosses three partials (33 acres). An old logging or mining road off the existing BLM road can offer access to two landowners. Forty-seven acres is accessible to one landowner if a private easement exists or is obtained and 19 acres is accessible to a second landowner if two private easements exists or are obtained. Access of this 19 acre partial from the new iron gulch road would be unlikely. Access would require a private easement and a BLM ROW, a new ~1,500 ft. road would have to be built, the new road would have to cross the drainage and rugged terrain, and a road is already in place from the private partials discussed above. The effects analysis of this document does not adequately cover the anticipated ROW application effects and any proposed ROW should be covered by an additional environmental assessment analysis.

Summary of impacts of this potential ROW on wildlife are:

- Sixty-eight acres of additional security habitat would be lost due to an additional permanent road with motorized access unless the existing access is closed then 19 acres of security habitat would be gained.
- Increased potential for development of a 36 acre private inholding due to ease of access and economic feasibility.
- Increased potential for development of 105 acres of private inholdings would not be reasonably foreseeable due to the ROW, because of existing

roads accessing the area on private land and due to rugged terrain.

- Additional ROW requests and users would increase these impacts.

The potential for an additional 141 acres of vegetation treatment exists if all the private landowners choose to treat their partials in connection to the BLM treatments. Depending on private treatment prescriptions, the short and long term effects are expected to be very similar to the BLM treatment effects outlined above in the T&E and wildlife sections. There would be no additional impacts to security habitat since the area falls within the road disturbance buffers.

As analyzed in the wildlife section increased potential for recreational use is expected due to treatments. With the establishment of legal easements through private land and building of new roads it is expected that human traffic will increase. The BLM is currently working on a travel management plan for the entire Lewistown Field Office. That document could change how the proposed new roads are used in the North Moccasins. A previous Judith Moccasin travel management plan was scoped and analyzed but was never finished. In that plan motorized and ATV access was to be proposed to the North Moccasins and would be determined on a route by route basis.

Chapter 4
Public Scoping, Consultation, and Coordination

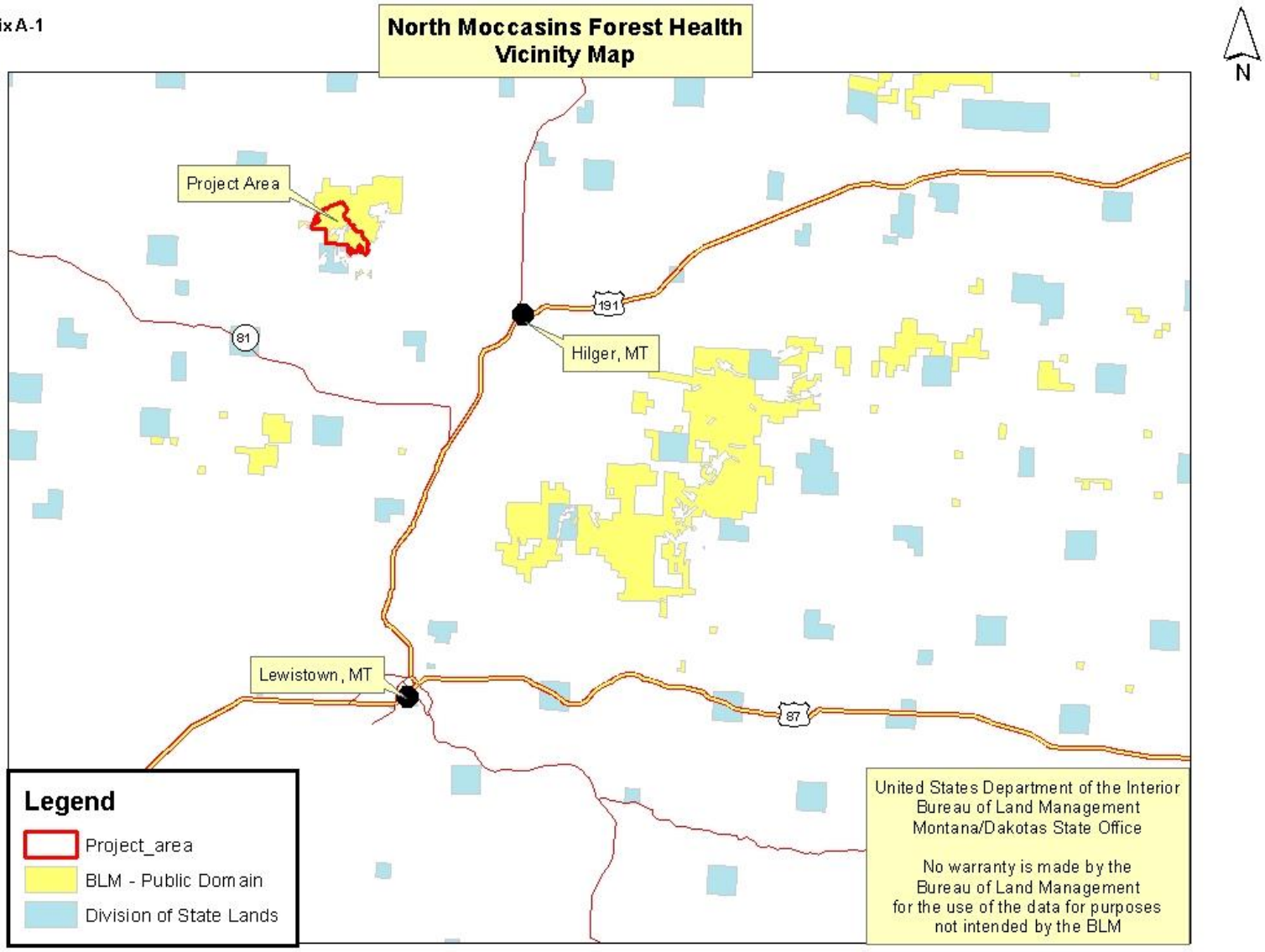
In addition to the timeline of public involvement outlined in section 1.4.1, the following individuals, groups and agencies were consulted with and/or provided opportunities to coordinate activities:

Name	Purpose for Consultation or Coordination	Location/Agency
Dennis Davaz	Forester	R-Y Timber, Inc.
Steve Diekman	Adjacent Landowner	Bozeman, MT
Fred Pico	Adjacent Landowner	Lewistown, MT
Chris Birdwell Brett Birdwell	Adjacent Landowner	Lewistown, MT
Jim Volberding	Adjacent Business/Access	Kendall Mine
Matt Birdwell	Adjacent Landowner	Lewistown, MT

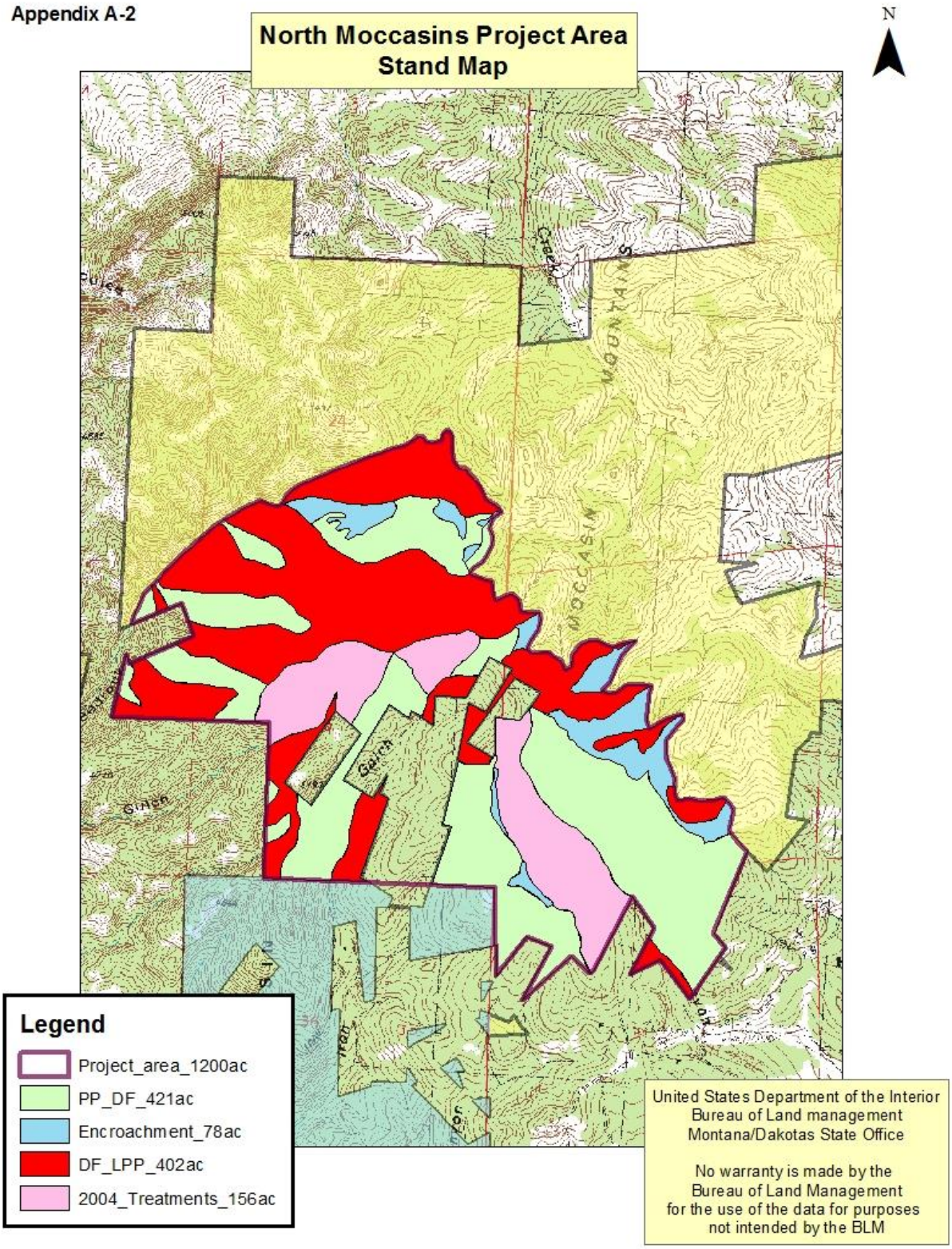
Chapter 5
List of Preparers

Bruce Reid	Forester – Team Lead
Zane Fulbright	Cultural Resources
Andy Oestreich	Wildlife Biologist
Josh Barta	Fuels Specialist
Steve Smith	Weed Specialist
Katie Decker	Range Management Specialist/Soils
Kelly Scarbrough	Outdoor Recreation/VRM
Debbie Tucek	Realty Specialist
Chad Krause	Water Resources
Dan Brunkhorst	NEPA/Review

Appendix A-1


North Moccasins Forest Health
Vicinity Map
N
Project Area
191
81
Hilger, MT
Lewistown, MT
87
Legend
Project_area
BLM - Public Domain
Division of State Lands
United States Department of the Interior
Bureau of Land Management
Montana/Dakotas State Office
No warranty is made by the
Bureau of Land Management
for the use of the data for purposes
not intended by the BLM

Appendix A-2


North Moccasins Project Area
Stand Map
N
MOCCASIN MOUNTAINS
Legend
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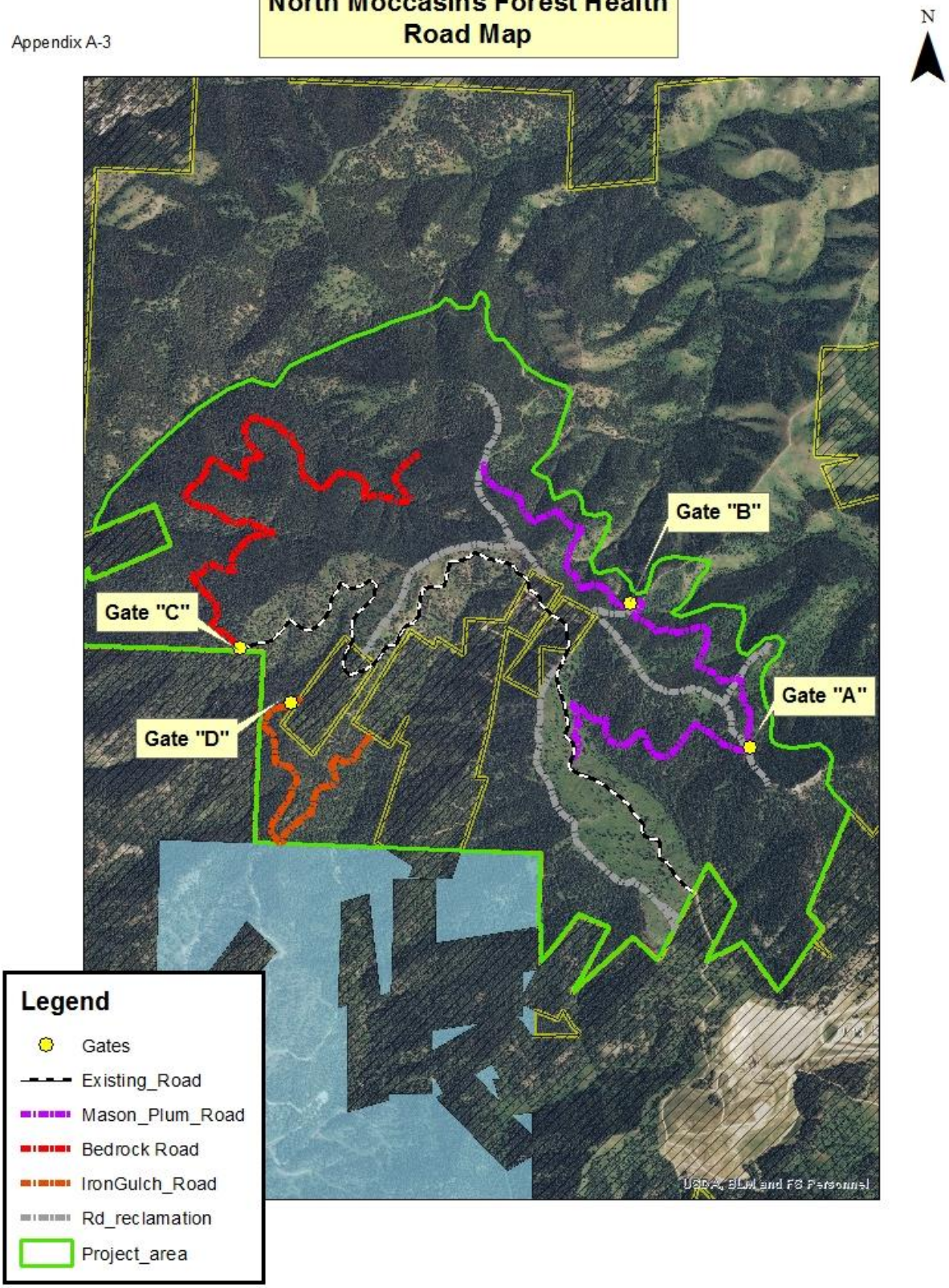
Bureau of Land management
Montana/Dakotas State Office
No warranty is made by the
Bureau of Land Management
for the use of the data for purposes
not intended by the BLM

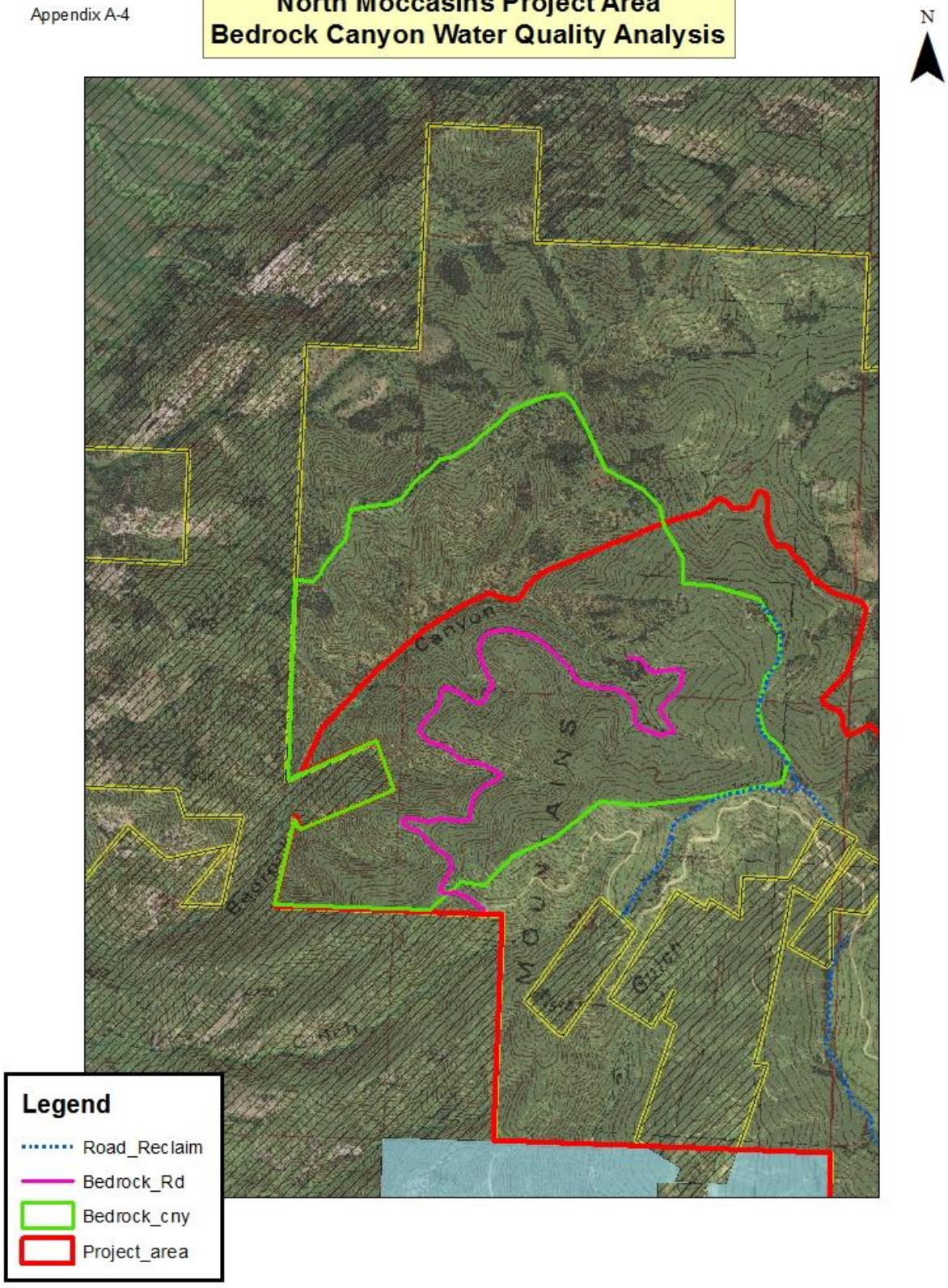
Appendix A-3

North Moccasins Forest Health Road Map



Appendix A-4

North Moccasins Project Area
Bedrock Canyon Water Quality Analysis



Appendix A-5.

Project Name:	North Moccasin Forest Health Restoration Project	Date: May 2015; Jun 2015; Jul 2015; Nov 2015; Dec 2015; Feb 2016
Project Number:	DOI-BLM-MT-L060-2015-0004-EA	Evaluators: Andrew Oestreich Wildlife Biologist
Project Location:	T 18N R 17E Sec: 24-26 Duck Creek Drainage T 18N R 18E Sec: 30-31	

[1]**Status Codes**: **E**=federally listed endangered; **T**=federally listed threatened; **C**=federally proposed/candidate for listing; and **S**=BLM sensitive

[2]**Exclusion Rationale Codes**: **ODR**=outside known distributional range of the species; **HAB**=no habitat present in Analysis Area; **SEA**=species not present/affected during season

Species Common and Scientific Name	Status[1]	Potential to Occur?	Rationale for Exclusion[2]	Brief Habitat Description and Range in Montana
FISH				
Artic Grayling *Thynallus arcticus montanus*	S	☐	ODR	found primarily small, cold, clear lakes with tributaries suitable for spawning. They do not coexist well with other fishes except cutthroat trout and others with which they evolved.
Bull Trout *Salvelinus confluentus*	T	☐	ODR	Sub-adult and adult fluvial bull trout reside in larger streams and rivers and spawn in smaller tributary streams, whereas adfluvial bull trout reside in lakes and spawn in tributaries (Montana AFS Species Status Account). They spawn in headwater streams with clear gravel or rubble bottom (Brown 1971, Holton 1981).
Iowa Darter *Etheostoma exile*	S	☐	ODR	clear slow-flowing streams with solid bottoms, although they have a wide range of tolerance for changes in water flow rates. They are also found in lakes and reservoirs, such as Nelson Reservoir east of Malta (Brown 1971). In Little Beaver Creek (Carter County),
Northern redbelly dace x Finescale dace *Phoxinus eos x Phoxinus neogaeus*	S	☐	HAB	Northern redbelly dace prefer quiet waters from beaver ponds, bogs and clear streams. The finescale dace likes similar habitat but is also found in larger lakes. Known in Big Coulee Ck in Judith Basin Co.
Paddlefish *Polyodon spathula*	S	☐	ODR	slow or quiet waters of large rivers or impoundments. They spawn on the gravel bars of large rivers during spring high water. Paddlefish tolerate, or perhaps seek, turbid water
Pearl Dace *Margariscus margarita*	S	☐	ODR	Pearl dace prefer small cool streams, either clear or turbid (Brown 1971). They spawn in clear water at depths of 1 to 2 feet over a gravel or sand bottom (Brown 1971).
Pallid Sturgeon *Scaphirhynchus albus*	E	☐	ODR	large turbid streams including the Missouri and Yellowstone rivers. They use all channel types, primarily straight reaches with islands. They primarily use areas with substrates containing sand (especially bottom sand dune formations) and fines (93% of observations)
Sauger *Stizostedion canadense*	S	☐	ODR	larger turbid rivers and the muddy shallows of lakes and reservoirs. They spawn in gravelly or rocky areas in shallow water and seem to prefer turbid water.
Sturgeon chub *Macrhybopsis gelida*	S	☐	ODR	turbid water with moderate to strong current over bottoms ranging from rocks and gravel to coarse sand
Westslope cutthroat trout *Oncorhynchus clarki lewisi*	S	☐	ODR	gravel substrate in riffles and pool crests for spawning habitat. Cutthroat trout have long been regarded as sensitive to fine sediment
White Sturgeon (Kootenai River Population) *Scaphirhynchus albus*	E	☐	ODR	The White Sturgeon population in Montana is part of a landlocked population occurring only in Kootenai River from Kootenai Falls in Montana downstream to Bonnington Falls in British Columbia (USFWS 1993).

Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri*	S	☐	ODR	Yellowstone cutthroat trout inhabit relatively clear, cold streams, rivers, and lakes. Optimal temperatures have been reported to be from 4 to 15 degrees C., with occupied waters ranging from 0 to 27 degrees C. (Gresswell 1995
AMPHIBIANS AND REPTILES				
Great Plains toad *Bufo cognatus*	S	☐	HAB	sagebrush-grassland, rainwater pools in road ruts, in stream valleys, at small reservoirs and stock ponds, and around rural farms; breeding has been documented in small reservoirs and backwater sites along streams appears to prefer stock tanks and roadside ponds rather than floodplains. Eggs and larvae develop in shallow water, usually clear or slightly turbid, but not muddy.
Northern Leopard frog *Lithogates pipiens*	S	☐	HAB	a mosaic of habitats to meet annual requirements of all life stages. Generally separate sites are used for breeding and overwintering, but this may occur in the same pond in some cases. They occupy a variety of wetland habitats of relatively fresh water with moderate salinity, including springs, slow streams, marshes, bogs, ponds, canals, flood plains, beaver ponds, reservoirs, and lakes, usually in permanent water with rooted aquatic vegetation. Habitats are often with few or no trees
Plains spadefoot *Spea bombifrons*	S	☐	HAB	soft sandy/gravelly soils near permanent or temporary bodies of water. lives largely inactive in burrows of its own construction or occupies rodent burrows, and enters water only to breed. Following heavy rains, adults have been reported in water up to 30 centimeters deep in flooded wagon wheel ruts, temporary rain pools formed in wide flat-bottom coulees, water tanks, and badland seep ponds, and tadpoles and toadlets have been observed in stock ponds and small ephemeral reservoirs, usually in sagebrush-grassland habitats
Western toad *Anaxyrus boreas boreas*	S	☐	ODR	utilize a wide variety of habitats, including desert springs and streams, meadows and woodlands, mountain wetlands, beaver ponds, marshes, ditches, and backwater channels of rivers where they prefer shallow areas with mud bottoms
Greater short-horned lizard *Phrynosoma hernandesi*	S	☐	HAB	ridge crests between coulees, and in sparse, short grass and sagebrush with sun-baked soil. limestone outcrops in canyon bottoms of sandy soil with an open canopy of limber pine-Utah juniper, and are also present on flats of relatively pebbly or stony soil with sparse grass and sagebrush cover
Milksnake *Lampropeltis triangulum*	S	☐	HAB	open sagebrush-grassland habitat and ponderosa pine savannah with sandy soils, most often in or near areas of rocky outcrops and hillsides or badland scarps, sometimes within city limits.
Snapping turtle *Chelydra serpentia*	S	☐	ODR	occur in all types of shallow freshwater habitats, such as streams, rivers, reservoirs, and ponds, especially those with a soft mud bottom and abundant aquatic vegetation or submerged brush and logs (Hammerson 1999), and in brackish water in some areas. Although found most often in shallower water, they have been reported on the bottom of lakes in water up to 10 meters deep. Temporary ponds may also be occupied
Spiny softshell *Apalone spinifera*	S	☐	ODR	primarily a riverine species, occupying large rivers and river impoundments, but also occurs in lakes, ponds along rivers, pools along intermittent streams, bayous, irrigation canals, and oxbows. open sandy or mud banks, a soft bottom, and submerged brush and other debris. Spiny Softshells bask on shores or on partially submerged logs. They burrow into the bottoms of permanent water bodies, either shallow or relatively deep (0.5 to 7.0 meters), where they spend winter. Eggs are laid in nests dug in open areas in sand, gravel, or soft soil near water
Western hog-nosed snake *Heterodon nasicus*	S	☐	HAB	apparent preference for arid areas, farmlands, and floodplains, particularly those with gravelly or sandy soil, has been noted. They occupy burrows or dig into soil, and less often are found under rocks or debris, during periods of inactivity

BIRDS				
American Bittern *Botaurus lentigmosus*	S	☐	HAB	Prefers large freshwater wetlands with tall emergent vegetation such as bulrushes and cattails, occasionally in sparsely vegetated wetlands. Nest is a platform over shallow water made of dried rushes, cattails, and sedges supported by dense emergent vegetation. Forages in marsh vegetation and wet meadows.
Baird's sparrow *Ammodramus bairdii*	S	☐	HAB	nest in native prairie, but structure may ultimately be more important than plant species composition. (nesting has been observed in crested wheat, while smooth brome is avoided) areas with little to no grazing activity are required.
Bald eagle *Haliaeetus leucocephalus*	S	✓		near open water including rivers, streams & lakes, nesting & roosting in large ponderosa pine, Douglas-fir, or cottonwood trees in proximity to open water and rivers.
Black tern *Chilodonias niger*	S	☐	HAB	wetlands, marshes, prairie potholes, and small ponds. 30%-50% of the wetland complex is emergent vegetation. Vegetation within known breeding colonies includes alkali bulrushes, canary reed-grass, cattail spp., sedge spp., rush spp., reed spp., grass spp., *Polygonum* spp., *Juncus* spp. and *Potamogeton* spp., indicating a wide variety of potential habitats are usable by Black Terns. Water levels range from about 0.5 m to greater than 2.0 m with most having depths between 0.5 m and 1.0 m (MTNHP 2003).
Black-backed woodpecker *Picoides arcticus*	S	✓	ODR, analyzed due to proximity and habitat type.	early successional, burned forest of mixed conifer, Lodgepole pine, Douglas-fir, and spruce-fir, although they are more numerous in lower elevation Douglas-fir and pine forest habitats than in higher elevation subalpine spruce forest habitats
Blue-gray gnatcatcher *Polioptila caerulea*	S	☐	ODR	inhabit deciduous forest, riparian woodland, open woodland, second-growth, scrub, brushy areas and chaparral in the east, south, and coastal west (Tropical to lower Temperate zones) (American Ornithologists' Union 1983, Ellison 1992). In the Great Basin region of the west they also occupy open pine woodland, where (in Wyoming) they are associated with rosaceous shrubs and rock outcrops (Pavlacky and Anderson 2001)
Brewer's sparrow *Spizella breweri*	S	☐	HAB	Sagebrush, mountain meadows, and mountain shrub habitats. nested in sagebrush averaging 16-inches high. The cover (concealment) for the nest provided by sagebrush is very important
Burrowing Owl *Athene cunicularia*	S	☐	HAB	open grasslands, where abandoned burrows dug by mammals such as ground squirrels (Spermophilus spp.), prairie dogs (Cynomies spp.) and Badgers (Taxidea taxus) are available. Black-tailed Prairie Dog (Cynomys ludoviscianus) and Richardson's Ground Squirrel (Spermophilus richardsonii) colonies provide the primary and secondary habitat for Burrowing Owls in the state (Klute et al. 2003). The burrows may be enlarged or modified, making them more suitable
Caspian Tern *Hydroprogne caspia*	S	☐	SEA-Winter	Prefers islands within larger lakes and reservoirs with sandy or stony beach, which are used for nesting. Has been found along rivers, although the area is unknown as a nesting habitat.
Chestnut-collared longspur *Calcarius ornatus*	S	☐	HAB	Species prefers short-to-medium grasses that have been recently grazed or mowed. Prefers native pastures.
Common Tern *Sterna hirundo*	S	☐	HAB	Nests on sparsely vegetated islands in large bodies of water. Nest substrate includes sandy, pebbly, or stony matter surrounded by matted or sparsely scattered vegetation. A BLM Lewistown study showed that the Common Tern selects sites larger than 30 acres with emergent vegetation covering more than 25% of the shoreline with all nesting occurring on islands.
Ferruginous hawk *Buteo regalis*	S	☐	HAB	mixed-grass prairie, shrub-grasslands, grasslands, grass-sagebrush complex, and sagebrush steppe.

Flammulated owl *Otus flammeolus*	S	☐	ODR	old-growth or mature ponderosa pine, ponderosa pine, & Douglas-fir forests, often mixed with mature aspen, nesting in cavities, feeding on insects.
Forster's Tern *Sterna forsteri*	S	☐	HAB	Prefers large marshes with extensive reed beds or Muskrat houses, occasionally along marshy borders of lakes and reservoirs. Nests colonially, close to foraging sites. Sites can be 100 acres with more than 25% vegetation coverage of the shoreline.
Franklin's gull *Larus pipixcan*	S	☐	HAB	Preferring large, relatively permanent prairie marsh complexes, the Franklin's Gull builds its nests over water on a supporting structure of emergent vegetation. Nesting is noted to occur in cattails and bulrushes
Golden eagle *Aquila chrysaetos*	S	✓		nest on cliffs and in large trees (occasionally on power poles), and hunt over prairie and open woodlands. Cliff nests selected for south or east aspect, less than 200 in. snowfall, low elevation, availability of sagebrush/grassland hunting areas
Great gray owl *Strix nebulosa*	S	☐	ODR	Great Gray Owls are known to use lodgepole pine/Douglas-fir in Montana. Habitat information from other Great Gray Owl sources state that their habitat is dense coniferous and hardwood forest, especially pine, spruce, paper birch, poplar, and second-growth, and especially near water. They forage in wet meadows, boreal forests and spruce-tamarack bogs in the far north, and coniferous forest and meadows in mountainous areas
Greater sage-grouse *Centrocercus urophasianus*	S	☐	HAB	tall dense stands of sagebrush; 6 to 18 inch high sagebrush covered benches in June to July (average 213 acres); move to alfalfa fields (144 acres) or greasewood bottoms (91 acres) when forbs on the benches dry out; and move back to sagebrush (average 128 acres) in late August to early September (Peterson 1969).
Lewis's woodpecker *Melanerpes lewis*	S	☐	ODR	Important habitat features include an open tree canopy, a brushy understory with ground cover, dead trees for nest cavities, dead or downed woody debris, perch sites, and abundant insects. Lewis's Woodpeckers use open ponderosa pine forests, open riparian woodlands dominated by cottonwood (*Populus* spp.), and logged or burned pine. They also use oak (*Quercus* spp.) woodlands, orchards, pinyon-juniper woodlands, other open coniferous forests, and agricultural lands. Apparently the species prefers open ponderosa pine at high elevations and open riparian forests at lower elevations (Bock 1970, Tobalske 1997). In the Blue Mountains of Oregon, they showed a preference for open stands near water (Thomas et al. 1979). Because the species catches insects from the air, perches near openings or in open canopy are important for foraging habitat (Bock 1970, Tobalske 1997).
Least tern *Sternula antillarum*	E		ODR	nest on unvegetated sand-pebble beaches and islands of large reservoirs and rivers in northeastern and southeastern Montana, specifically the Yellowstone and Missouri river systems.
Long Billed Curlew *Numenius americanus*	S	☐	HAB	The Long-billed Curlew breeds in mixed grass prairie habitats and moist meadows throughout Montana. It prefers to nest in open, short-statured grasslands and avoids areas with trees, dense shrubs, or tall, dense grasses (Dugger and Dugger 2002).
Loggerhead shrike *Lanius ludovicianus*	S	☐	HAB	open riparian areas, montane meadows, agricultural areas, grasslands, shrublands, & piñon/juniper woodlands
McCown's longspur *Calcarius mccownii*	S	☐	HAB	breeding habitat is a matrix of perennial short grass species (e.g., *Bouteloua gracilis*, *Buchloe dactyloides*) interspersed with cactus, and limited cover of midgrasses (e.g., *Aristida longiseta*, *Agropyron smithii*, *Stipa comata*) and shrubs (e.g., *Gutierrezia sarothrae*, *Chrysothamnus nauseosus*, *Artemesia frigida*).
Mountain plover *Charadrius montanus*	S	☐	HAB	prairie dog colonies and other short grass prairie sites are confirmed as preferred breeding habitat. Strong preference was also given to sites with slopes less than 5% and grass height of less than 6 cm (3 inches)

Peregrine falcon *Falco peregrinus anatum*	S	☐	HAB	wide variety of habitats, selects cliff ledges or rock outcroppings for nesting, preferring high, open cliff faces that dominate the surrounding area.
Piping Plover *Charadrius melodus*	T	☐	HAB	Nests on sand or pebble beaches on freshwater and saline wetlands, lakes, reservoirs and rivers. Only nests in areas with sparse to no vegetation. Summer range primarily in northeastern Montana with isolated population in Pondera County.
Red-headed woodpecker *Melanerpes erythrocephalus*	S	✓		along major rivers having riparian forest. open savannah country w/ ground cover, snags and canopy cover. Large burns also utilized. nest in holes excavated 2 to 25 meters above ground by both sexes in live trees, dead stubs, utility poles, or fence posts. Individuals nest in the same cavity in successive years.
Red Knot *Calidris canutus rufa*	T	☐	SEA	Migratory stopovers in Montana are rare, but are most common at larger wetlands and 60 percent of documented migratory stopovers in Montana have been at Freezeout Lake, Benton Lake National Wildlife Refuge, and Lake Bowdoin National Wildlife Refuge (Montana Natural Heritage Program Point Observation Database 2014).
Sagebrush Sparrow *Artemisiospiza nevadensis*	S	☐	ODR	Prefers the interior of large, contiguous areas of big sagebrush or sagebrush-saltbush habitats. Positively correlated with sagebrush cover, height and bare ground and negatively correlated with grass cover.
Sage thrasher *Oreoscoptes montanus*	S	☐	HAB	sagebrush obligate in Montana. abundance is generally positively correlated with the amount of sage cover and negatively correlated with grass cover.
Sprague's pipit *Anthus spragueii*	C/S	☐	HAB	native, medium to intermediate height prairie and in a short grass prairie landscape, can often be found in areas with taller grasses. more abundant in native prairie than in exotic vegetation; area sensitive, requiring relatively large areas of appropriate habitat.
Trumpeter swan *Cygus buccinator*	S	☐	ODR	The breeding habitat for Trumpeter Swans in the Red Rock Lakes/Centennial Valley of Montana includes lakes and ponds and adjacent marshes containing sufficient vegetation and nesting locations. Along the Rocky Mountain Front the breeding habitat is small pothole lakes, generally with sufficient water to maintain emergent vegetation through the breeding season (Montana Natural Heritage Program Point Observation Database). Habitat requirements for breeding include room to take off (~100 m), shallow, unpolluted water with sufficient emergent vegetation and invertebrates, appropriate nest sites (i.e. Muskrat lodges), and areas with little human disturbance (Mitchell 1994).
Veery *Catharus fuscescens*	S	✓		Generally inhabits damp, deciduous forests in the east. Has a strong preference for riparian habitats in several regions, including the Great Plains. Prefers disturbed forest, probably because denser understory is not found in undisturbed forests. In Montana, Veerys are often associated with willow thickets and cottonwood along streams and lakes in valleys and lower mountain canyons.
Whooping Crane *Grus americana*	E	☐	ODR	The Whooping Crane has been observed in the marsh habitat present at Medicine Lake National Wildlife Refuge and Red Rock Lakes National Wildlife Refuge. Observations of individual birds in other areas of the state include grain and stubble fields as well as wet meadows, wet prairie habitat, and freshwater marshes that are usually shallow and broad with safe roosting sites and nearby foraging opportunities (Montana Bird Distribution Committee 2012).

Yellow-billed cuckoo (Western Distinct pop. Segment) *Coccynus americanus*	S	□	ODR	Throughout their range, preferred breeding habitat includes open woodland (especially where undergrowth is thick), parks, and deciduous riparian woodland. In the West, they nest in tall cottonwood and willow riparian woodlands. Nests are found in trees, shrubs or vines, an average of 1 to 3 meters above ground (Harrison 1979). Western subspecies require patches of at least 10 hectares (25 acres) of dense, riparian forest with a canopy cover of at least 50 percent in both the understory and overstory. Nests are typically found in mature willows (Biosystems Analysis, Inc. 1989). This bird is rarely found at higher elevations (Johnsgard 1986).
MAMMALS				
Black-footed ferret *Mustela nigripes*	E		ODR	intimately tied to prairie dogs and only found in association with prairie dogs. limited to habitat used by prairie dogs: grasslands, steppe, and shrub steppe. rely on abandoned prairie dog burrows for shelter. Only large complexes (several thousand acres of closely spaced colonies) can support and sustain a breeding population. estimated that 40 to 60 hectares of prairie dog colony is needed to support one Black-footed Ferret, and females with litters have never been found on colonies less than 49 hectares
Black-tailed prairie dog *Cynomys ludovicianus*	S	□	HAB	colonies are found on flat, open grasslands and shrub/grasslands with low, relatively sparse vegetation. The most frequently occupied habitat in Montana is dominated by western wheatgrass, blue grama and big sagebrush. Colonies are associated with silty clay loams, sandy clay loams, and loams and fine to medium textured soils are preferred, presumably because burrows and other structures tend to retain their shape and strength better than in coarse, loose soils.
Canada lynx *Lynx canadensis*	T	□	ODR	dense spruce-fir, Douglas-fir, early seral lodgepole pine, mature lodgepole pine with developing understory of spruce-fir & aspen in subalpine zone & timberline, using caves, rock crevices, banks, logs for denning, closely associated with snowshoe hare.
Fisher *Martes pennati*	S	□	ODR	When inactive, they occupy dens in tree hollows, under logs, or in ground or rocky crevices, or they rest in branches of conifers (in the warmer months). Fishers occur primarily in dense coniferous or mixed forests, including early successional forests with dense overhead cover (Thomas 1993). They commonly use hardwood stands in summer but prefer coniferous or mixed forests in winter and avoid open areas. Optimal conditions for Fishers are forest tracts of 245 acres or more, interconnected with other large areas of suitable habitat. A dense understory of young conifers, shrubs, and herbaceous cover is important in summer.
Fringed myotis *Myotis thysanodes*	S	✓		rocky outcroppings in mid-elevation ponderosa pine, piñon/juniper, oak, & mixed conifer woodlands, grasslands, deserts, & shrublands;
Gray wolf *Canis lupis*	S	□	ODR	no particular habitat preference except for the presence of native ungulates within its territory on a year-round basis. Gray Wolves establishing new packs in Montana have demonstrated greater tolerance of human presence and disturbance than previously thought characteristic of this species.
Grizzly bear *Ursus arctos horribilis*	T	□	ODR	primarily use meadows, seeps, riparian zones, mixed shrub fields, closed timber, open timber, side hill parks, snow chutes, and alpine slab rock habitats. Habitat use is highly variable between areas, seasons, local populations, and individuals. Historically, the Grizzly Bear was primarily a plains species occurring in higher densities throughout most of eastern Montana.

Northern Long-eared Bat *Myotis septentrionalis*	T	□	ODR	In Montana, Northern Myotis have been located hibernating in an abandoned mine in river breaks habitat in Richland County (Swenson and Shanks 1979). Northern Myotis (Myotis septentrionalis) prefers cooler hibernacula than Myotis lucifugus and selects narrow crevices in which to hibernate. Summer day roosts are often in cavities or crevices behind peeling bark in trees, usually in tall, wide-diameter and partially dead hardwoods (Caceres and Barclay 2000).
Pygmy Rabbit *Brachylagus idahoensis*	S	□	ODR	shrub-grasslands on alluvial fans, floodplains, plateaus, high mountain valleys, and mountain slopes, where suitable sagebrush cover and soils for burrowing are available. Some occupied sites may support a relatively sparse cover of sagebrush and shallow soils, but these usually support patches of dense sagebrush and deeper soils. Big sagebrush was the dominant shrub at all occupied sites, averaging 21.3 to 22.6% coverage; bare ground averaged 33% and forbs 5.8%. Average height of sagebrush in occupied sites was 0.4 meter (Rauscher 1997).
Spotted Bat *Euderma maculatum*	S	✓		Most often in open arid habitats dominated by Utah juniper and sagebrush sometimes intermixed with limber pine or Douglas-fir, or in grassy meadows in Ponderosa pine savannah. Other common habitat attributes are cliffs, rocky outcrops, and water sources. Roosts in caves and cracks and crevices in cliffs and canyons.
Swift fox *Vulpes velox*	S	□	HAB	open prairie and arid plains, including areas intermixed with winter wheat fields in north-central Montana. They use burrows when they are inactive; either dug by themselves or made by other mammals (marmot, prairie dog, badger). The burrows are usually located in sandy soil on high ground such as hill tops in open prairies, along fencerows, or occasionally in a plowed field. Suitable habitat generally extensive in size (preferably over 100,000 acres), with relatively level topography, and with greater than 50% of the area undisturbed by agriculture. A total of 8,000,000 suitable acres were identified in Montana
Townsend's big-eared bat *Plecotus townsendii*	S	✓		associated with caves & abandoned mines for day roosts & hibernacula, will also use abandoned buildings in western shrubland, piñon/juniper woodlands, & open montane forests in elevations up to 9,500 ft.
White-tailed Prairie Dog *Cynomys leucurus*	S	□	ODR	White-tailed Prairie Dogs inhabit xeric sites with mixed stands of shrubs and grasses. In Montana they inhabit these habitats dominated by two types of vegetation: areas with Gardener's saltbush (Atriplex gardneri) with lesser amounts of big sage, and areas with small-flowered marsh-elder (Iva axillaris) and winterfat (Krascheninnikovia lanata)(Flath and Paulick 1979). They live at higher elevations and in meadows with more diverse grass and herb cover than do Black-tailed Prairie Dogs (Wilson and Ruff 1999) and their range in Montana is at higher elevations than other areas across their distribution.
Wolverine *Gulo gulo*	S	□	ODR	limited to alpine tundra, and boreal and mountain forests (primarily coniferous) in the western mountains, especially large wilderness areas. However, dispersing individuals have been found far outside of usual habitats. They are usually in areas with snow on the ground in winter. Riparian areas may be important winter habitat. When inactive, Wolverines occupy dens in caves, rock crevices, under fallen trees, in thickets, or similar sites. Wolverines are primarily terrestrial but may climb trees

Other Animal Classifications *Hunting/ Fishing*	**Potential to Occur?**	**Special habitat Type?**	**Species known or expected to occur in the area.**	**Species known or expected to occur in the area not covered above.** **Expected Effects, Comments**
Upland Game Birds	✓	Year round	Blue and Ruffed Grouse	Various species of Grouse are expected in the project area, none observed. Short term displacement during the project will occur. Immediately following the treatments the amount of available forage is expected to decline until vegetation regrowth can occur. After revegetation, long term affects include increased foraging opportunities due to increased diversity in Aspen and deciduous shrubs and grass/forb production. Increased vegetation diversity could increase forage for insects used by grouse. Treatments would increase edge and benefit these species. Road cuts would allow easier access for hunters and people, generally negative due to hunting and general disturbance
Big Game Species	✓	Year round	Elk, Mule Deer, Whitetail Deer, Moose.	Mule deer and Elk have been observed in the project area. Most observations of these species have been in the previous treatment areas and in the mine area where more forage is present. Tracks in the snow observed in the late fall and winter show the area is used mostly as a travel corridor from ranches and private property at lower elevations to the fire scare locations to the Northeast and treatment areas mentioned above. The area is also used as cover from hunters and general public. Short term displacement during the project will occur. After re-vegetation from logging damage can occur long term affects include increased foraging opportunities due to increased diversity in Aspen and deciduous shrubs and grass/forb production. Treatments would increase edge and benefit these species. Road cuts would allow easier access for hunters and people impacts generally negative. Increased access and potential for development of private inholding is likely to occur. Private development on adjacent private land would fragment and otherwise intact area. Limiting motorized impacts on trails will help offset non-motorized users on permanent roads.

Furbearers- and prey species	✓	Year round	Coyotes, Bobcats, Beaver, Muskrat, Fox, Pine Martin.	Furbearers are expected in the project area. Coyote tracks have been seen but no other furbearers or sign have been observed. Short term displacement is expected for both furbearers and prey species. Long-term habitat should improve with treatment due to increased forage production for prey. Prey sources may shift due to changes in habitat for prey species. Increased human and potentially trapping activity could occur due to easier access. Slash piles and down woody debris will provide cover for small mammals. Vegetation diversity will provide diverse food sources, however cone productions will decrease due to fewer trees.
Introduced Sport Fish *Walleye, Rainbow trout…*	□	Not in habitat	Brown trout, Brook trout, Rainbow trout, etc.	Duck creek is not a known fishery. No data is available from MFISH. Duck creek is a tributary to warm springs as are many other creeks. The potential exists for multiple fish species to swim upstream. Adhering to SMZ Laws will limit potential for impacts downstream outside the analysis area fed by the duck creek drainage.
Predators	✓	Year round	Coyotes, Bobcats, Mountain Lion, Black Bear- Expected in the area.	Mountain lion tracks have been observed in the project areas. The North and South Moccasin ranges are also known for Mountain Lion hunting. No bears or sign have been observed but they are expected in the area. Short term displacement is expected for both species due to their private nature and displacement of their prey species. Long-term habitat should improve with treatment due to increased forage for their prey sources. Increased vegetation diversity should also increase foraging opportunities for bears. Road cuts would allow easier access for hunters and people impacts generally negative. Potential for development of private inholding is likely to occur. Private development on adjacent private land would fragment and otherwise intact area and increase the chances for negative encounters between predators and humans.
Birds				
Scavengers	✓	Year round /migratory depending on species	Turkey Vulture s, Ravens and Magpies seen in the unit.	Turkey Vulture s, Ravens and Magpies seen in the unit. Direct and indirect Impacts expected to be minimal. Habitat should improve with treatment for generalists and habitat may decline for specialists.
Song Birds	✓	Year round /migratory depending on species	Chickadees, Nuthatches, Jays, Robins, and other birds seen in the unit.	Habitat should improve with treatment for generalists and habitat may decline for specialists.

Shore birds	☐	Not in habitat	Plovers, Wilsonss Snipe, American Avocet, Killdeer, Gulls, Sandpipers, and Terns	No shore birds have been observed or are expected in the project area. Adhering to SMZ Laws will limit potential for impacts to streams that would affect habitat downstream out of the project area, in particular areas outside the analysis area fed by the duck creek drainage.
Raptors	✓	Year round /migratory depending on species	American Kestrel, Eastern Screech Owl, Great Horned Owl, Long-Eared Owl, Northern Harrier, Northern Saw-Whet Owl, Prairie Falcon, Northern Goshawk, etc…	Red-tailed hawks, Golden Eagles, and a Coopers hawk have been observed in the project area. Accipiter's will likely see a decrease in nesting habitat due to treatments. One small stick nest of a coopers or sharp-shinned hawk was found outside the project area along an open road. The nest was on private land. Nest status was abandoned. Long term impacts would likely cause permanent displacement of individuals however increased habitat for prey species could improve habitat for remaining individuals. Treatments could also increase desirability for Buteo's to move into the area. Competition between accipiter's, and buteo's could result in displacement of accipiter's. Impacts on owls will differ between species. Impacts to forest specialists will be the same as accipiter's. Impacts to generalist owl species will be similar to buteo's.
Cavity nesters	✓	Year round /migratory depending on species	Hairy Woodpeckes, Downey Woodpeckers, Chicadees, Northern Flicker, etc...	There are multiple snags in the unit that have cavities and probably active nests. The plan states that snags will be left standing as long as they pose no threat to safety. Habitat should improve with treatment for generalists and habitat may decline for specialists.
Non-Game Mammals				
Bats	✓	Year round /migratory depending on species	Silver-haired bat, Big Brown Bat, and various myotis's	There are multiple snags in the unit that have cavities and potential for maternity roosts. The plan states that snags will be left standing as long as they pose no threat to safety. Habitat should improve with treatment for generalists and habitat may decline for specialists. Multiple species of bats, including forest specialists often forage over deciduous shrubs, riparian areas, and meadows that a commonly associated with insects they prey on.

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Appendix A-6.

Map Unit Components: 124—Hughesville-Skaggs flaggy loams, 15 to 60 percent slopes

Hughesville (55%): This component is on foothills, mountain slopes. The parent material consists of colluvium and/or residuum over fractured hard limestone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 55 percent.

Skaggs (20%): This component is on hills. The parent material consists of residuum over fractured hard limestone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 5 percent. This component is in the R043XC440MT Silty (si) 20"+ P.z. ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 50 percent.

Map Unit Component: 168—Mocmont very gravelly loam, 15 to 60 percent slopes

Mocmont (85%): This component is on mountain slopes. The parent material consists of alluvium and/or colluvium and/or residuum weathered from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map Unit Component: 238—Tigeron very gravelly loam, 15 to 60 percent slopes

Tigeron (90%): This component is on hills, plains. The parent material consists of alluvium derived from igneous rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Map UnitComponents: 262—Whitecow-Hughesville complex, 20 to 60 percent slopes

Whitecow (65%): This component is on mountain slopes. The parent material consists of alluvium and/or colluvium derived from limestone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 45 percent.

Hughesville (25%): This component is on foothills, mountain slopes. The parent material consists of colluvium and/or residuum over fractured hard limestone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 55 percent.

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